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MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF AN APPLICATION BY CANADIAN ARCTIC
GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT
BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON
TERRITORY AND THE NORTHWEST TERRITORIES FOR THE
PURPOSE OF THE PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Whitehorse, Y.T.,

August 13, 1975.

PROCEEDINGS AT INQUIRY

Volume 53-A

347
M835
Vol. 53A

CANADIAN ARCTIC
GAS STUDY LTD.

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Volume 53 A

APPEARANCES:

Ian Scott, Esq., Q.C.,
S.T. Goudge. Esq., & appear for Commission;

J.J. Marshall, Esq., appears for Canadian Arctic Gas
Pipeline Limited;

R.G. Gibbs, Esq., and
Mr. Hollingworth appear for Foothills Pipelines;

R. Veale, Esq., appears for Council of Yukon
Indians;

R. Anthony, Esq., appears for Canadian Arctic
Resources Committee;

G.W. Bell , Esq., appears for Indian & Metis
organizations of the Northwest
Territories;

J.U.Bayly, Esq., appears for Inuit Tapirisat of
the Mackenzie Delta.

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Vol. 53A

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5 John Ivor CLARK

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7 Alexander William Francis BANFIELD

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In Chief

1 (LETTER FROM A.D. HUNT, APRIL 16, 1974, MARKED
2 EXHIBIT 166)

3 (PROCEEDINGS ADJOURNED TO 8 P.M.)

4 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

5 THE COMMISSIONER: In the
6 meantime we'll carry on with the panel.

7 MR. VEALE: Mr. Commissioner,
8 --

9 THE COMMISSIONER: Excuse me,
10 before you start, I think I should just say for the
11 benefit of the people from Whitehorse who are here,
12 and may not have been here on previous evenings that
13 the people on my right are the secretary of the Inquiry,
14 the official Court reporters, who transcribe on tape
15 everything that is said, the C.B.C. Broadcasting
16 team from Yellowknife which broadcasts over the Northern
17 Service each evening from the Inquiry in English and
18 four native languages -- five native languages,
19 Eskimo, Chipewyan, Dogrib, Slavey and Loucheux, and
20 other members of the media. These gentlemen who sit
21 at the table in front are lawyers who represent the
22 various pipeline companies, the native organizations,
23 the environmental organizations, and some of them are
24 my lawyers too, because -- I should tell you that this
25 panel on my left consists of Mr. Collins, who
26 is nearest to the front of the room, Dr. Thompson, and
27 Mr. Leonard. Dr. Thompson and Mr. Leonard are
28 lawyers with what has been revealed to us as a very
29 extensive background in concerns relating to the
30 environment, and Mr. Collins is a very distinguished

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1 American who was responsible for the establishment of
2 the Alaska -- for the Arctic Natural Wildlife Range,
3 which you see on this map. It's in the north-east
4 corner of Alaska, and these gentlemen are proposing
5 now that there should be an extension of that Wildlife
6 Range into the Northern Yukon, and that's what that
7 map is all about, and at the break feel free to come
8 up and take a look at it.

Well, carry on then, Mr.

1 Anthony.

M R. ANTHONY: Thank you, Mr.
commissioner. When we broke earlier today we had
outlined the area of existence of the proposed Arctic
International Wildlife Range which is on the map, as
you've indicated, and Mr. Collins, with the help of a
publication in "Nature Canada" described the signifi-
cant environmental features of the range, and I would
also invite those who are interested to come forward,
we have extra copies of that article. Maybe you would
be interested in seeing and reading about that area.

As we proceed then I would
ask perhaps Mr. Collins, if you would start and give
us your comments on the question of the Arctic Inter-
national Wildlife Range and the question of pipeline
routes through that area.

WITNESS COLLINS: Thank you.

Some of this may be a little redundant to those of you
who were here earlier this afternoon and heard my
narrative presentation. But I'll go ahead, and I call
this summary of proposed presentation of mine before

Thompson, Leonard, Collins
In Chief

1 the Berger Inquiry at Whitehorse, August '75.

2 1. The Arctic National Wildlife Range, Alaska, and
3 the projected adjoining range in Yukon Territory, both
4 portions of the same habitat, physiographically one,
5 are in the path of routes preferred by industry for
6 a trans-Alaska-Canada gas pipeline.

7 THE COMMISSIONER: Excuse me,
8 Mr. Collins. Can you people at the back hear what
9 Mr. Collins is saying? Not very well? Just pull the
10 mike a little closer.

11 A Is this better? Should
12 I start again?

13 2 I think you should, yes.

14 A All right, I'll start
15 with :

16 1. The Arctic National Wildlife Range, Alaska, that's
17 the green on the map, and the projected adjoining range
18 in Yukon Territory, that's the yellow, pale yellow on
19 the right, both portions of the same habitat, and I
20 may say a physiographic unity, are in the path of routes
21 preferred by industry for a trans-Alaska-Canada gas
22 pipeline. It is recognized that oil exploration has
23 a long history in the North American Arctic. When the
24 Wildlife Range was established on December 6, 1960 --
25 that is on the Alaska side -- and for some years before
26 that during the campaign for the range, oil geologists
27 and other experts believed that sooner or later oil
28 would be discovered commercially within petroleum
29 reserve No. 4, or that immediate vicinity. So it
30 was no great surprise to them, however electrifying

Thompson, Leonard, Collins
In Chief

when discovery well No. 1 was brought in during January of 1968. Wildlife conservationists were well informed of the oil interests, at least as far back as the beginning of the 1950's. The U.S. Geological Survey experts informed the park and wildlife people that east of Pet 4 and Canning River as far over as the western side of the Mackenzie Delta generally there was very little likelihood of commercial oil discoveries being made.

That was one reason for selecting the Canning River as the major feature of the western boundary of the Wildlife Range, and it still holds after 25 years since we first drew that line. Thus the difficulty is no more than ever the possibility that oil and gas will be discovered in paying quantities within the whole region in both countries proposed for International Wildlife Range status. Rather the difficulty of immediate concern is that of getting Prudhoe Bay gas to market in the least costly manner to each of the major interests concerned -- government, and its public, industry, and the earth and life resources of the wildlife habitat themselves, however the range might be invaded.

During the Tundra Conference in 1969 at Edmonton, at several meetings during the winter of 1969 and '70 among Canadian and U.S. conservationists leading to the Whitehorse Conference of October 21 and 22, 1970, the International Wildlife Range idea was revived or advanced, I should say, it was never more than quiescent from time to time. It

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was taken up with the Canadians in the early '50's through Commissioner Collins (no relative or relationship with me) of Yukon Territory and others, but the drive was toward the establishment of the Alaska area as the first step, and the international goal gained no impetus officially, at that time.

One nationalistic viewpoint heard in the U.S. currently favors an all-Alaska gas pipeline route south from Prudhoe Bay to a seaport facility, then shipment by sea. However, the same experts who believe it unlikely that commercial oil resources are present in the projected International Wildlife Range are sanguine as to the probability of good prospects in the Camden Bay area. It's a "yes but" type of thing, Camden Bay at the mouth of the Canning.

THE COMMISSIONER: At the mouth of the Canning.

A Yes, right where the -- in the north-west corner of the green area is Camden Bay in the mouth of the Canning River. Let's see.

They were sanguine as to the probability of good prospects in the Camden Bay area, and even inland around the mouth of the Canning River. Now, that's, as I started to say, a "yes but" sort of thought here, because while in general we have been told by the U.S. Geological Survey experts -- and I have it documented properly in my records -- that there are little or no prospects of commercial findings in that area between the Canning River and east side of the International Range that's proposed, |

Thompson, Leonard, Collins
In Chief

still there are possibilities of some structures of oil and gas-bearing nature in the extreme north-west corner and out at sea. So I want to make that point in all fairness.

The offshore situation is said to be promising, more or less all the way across the ocean floor out from the projected International Wildlife Range. If this is significant of future development, there will be many pipelines, of course, interconnecting wells and trunk lines both oil and gas, and it is not conceivable that wildlife habitat -- that is the range and its surroundings, will escape invasion. On a nationalistic basis the oil and gas found offshore on the Alaska side would come out to market via Alaska, supposedly, and those resources found on the Yukon side would come out through Canada, supposedly. But the Wildlife Range would still be in the middle and would still suffer invasion regardless of which way Prudhoe Bay gas comes outside, as the first order of business next to the oil.

Another proposal first advocated for bringing out Prudhoe Bay oil, but now suggested for the gas resource, is to pipe the gas generally parallel to the oil line through the Brooks Range thence eastward and south through the Porcupine, Peel and Mackenzie Valleys. This writer explained and advocated such a route for consideration in testimony presented to the U.S. Department of the Interior in March of 1971.

THE COMMISSIONER: That was

Thompson, Leonard, Collins
In Chief

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1 possibility, nevertheless is kindred in a way to that
2 suggestion and I would hope that anything done on the
3 interior route would possibly be worked out with far
4 greater care than I think has been attended to so far.

5
6 Now the official corridor
7 shown on U.S. Department of the Interior presentations
8 for a route generally skirting the Wildlife Range, which
9 is what we're talking about, is already established
10 in Alaska on the areas west and south sides, presumably
11 is acceptable to some advocates. My own view is that
12 it would require routing the pipeline generally along
13 the coast from Prudhoe Bay eastward to the Canning
14 River Valley, thence up that valley and on through
15 Old Woman Creek, then eastward toward the Old Crow
16 Flats and the Mackenzie, across the Sheenjek, Coleen
17 and other waters in Alaska area. All of it is exception-
18 ally good habitat supporting important game populations.
19 If a choice between that route and an all-coast
20 route were demanded, it would be my view that an
21 all-coast route certainly would be less damaging to
22 the habitat.

The advantages of an all-land
trunk gas line route across Alaska and Canada are
compelling to me and to many of those with whom I am
associated. We hope this Inquiry will lead to an
early decision in this critically important question.
I thank you.

THE COMMISSIONER: Thank you
very much, Mr. Collins. I wonder if -- do we have
a copy of Mr. Collins' statement? Perhaps we could

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have it and it could be marked as an exhibit.

MR. ANTHONY: Mr. Commissioner,
the statements of Mr. Collins, of Dr. Leonard and Dr.
Thompson were sent as the synopsis to all these
witnesses so --

THE COMMISSIONER: Of course,
of course.

MR. ANTHONY: -- they certainly
will be available.

Q Perhaps Dr. Leonard, who
I should for those who have arrived this evening, say
is a lawyer from San Francisco and a long-time member
of conservation and environmental organizations in the
United States, Dr. Leonard, perhaps you would address
the Commission on your concerns in this matter?

WITNESS LEONARD: If any
can't hear me in the back, why just raise your hands
and I'll try to increase the volume.

I have a number of copies of
my statement here, for any who wish to have it after-
wards.

As president of the Conserva-
tion Law Society of America I am appearing here on
behalf of the Arctic International Wildlife Range
Society of Yukon Territory, and the president, Dr.
Thompson, and the vice-president, George Collins, have
just testified so I won't repeat of course any of
their information.

I will review the -- a little
bit further -- the alternate routes that this session

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1 of the Inquiry is to consider.

2 With admiration and respect
3 I have read the expert testimony and cross-examination
4 of the highly qualified experts who have testified
5 thus far before this Inquiry. I have read several
6 hundred pages of the Berger Inquiry from Hay River
7 and Yellowknife, I have read also several hundred pages
8 of Federal Power Commission hearings which are going
9 on somewhat simultaneously in Washington, D.C. I've
10 read about 3,000 pages of the Environmental Impact
11 Statement of the Department of Interior, which I must
12 say is very hard to read because it's rather repeti-
13 tive. A lot of information, though, of great value
14 is in it.

15 I therefore will not repeat
16 any of the detailed knowledge that has been presented
17 thus far, but I'll speak of the broader intangible
18 issues, based upon my long experience in the environ-
19 mental field.

20 Relatively early travel
21 through Barter Island and Prudhoe Bay in 1959,
22 I might say as a matter of interest that I was grounded
23 by fog at Point Barrow after visiting Barter Island and
24 Prudhoe, and so I got to playing chess with a geologist
25 of the Royal Dutch Shell from La Hague, and he said,
26 "Deek", he said, "there's lots of oil all over this
27 place," but he said, "it's absolutely worthless, you
28 can't get it to market and so my company, Shell Oil,
29 will not permit any drilling." He was absolutely cor-
30 rect as to the amount of oil. He's absolutely correct,

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1 it is still worthless today, because there isn't
2 any way you can get it to market; nor the gas either.

3 So after that as soon as
4 was discovered in 1968, George Collins, my wife and
5 and their partner, Dorothy Varian chartered a small
6 single engine Otter at Anchorage and we flew to all
7 of the oil-producing areas of Alaska, visited all the
8 in the Cook Inlet and Kenai Peninsula, and then went
9 back to Prudhoe Bay again, and spent a day and a night
10 there. Then just prior to this session, just yesterday
11 and the day before I flew, from near my previous exper-
12 ience at Barter Island, along the Arctic coast to the
13 east and then out to these artificial islands in the
14 Beaufort Sea, one of them being under construction at
15 the time, and I got some photographs of it, and another
16 one actually in operation, and then on to the Macken-
17 zie Delta and to Tuktoyaktuk, which is in operation
18 and has some wells both oil and gas that have been
19 proven but are still of course capped until we can
20 get that production out to market.

21 Then we came from Yellowknife
22 you see, to Norman Wells, and stopped at Norman Wells
23 to see some of the experimental work on the cold
24 pipeline, and then on up the entire -- or rather down,
25 I should say, the Mackenzie River to Inuvik and then
26 this other trip out to visit the coast again.

27 Well the Gas Arctic Northwest
Project Study Group, to my mind, has voluntarily
financed and provided more information of every kind
for public participation in the planning process than

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1 any other large project in history. I've been involved
2 in a great many of these, including the Alaska hot
3 oil pipeline down to Valdez. The basic data here
4 is fully available on cross-examination to all who are
5 participating in this Inquiry. I think it is most
6 important also to note the excellent action of the
7 Government of Canada in making this Inquiry open to
8 all the citizens of Canada and experts from other lands.

9 Just before I -- well, last
10 week a member of the International Council on Environ-
11 mental Law from Germany asked to come to visit with
12 me at my office, and I spent a couple of hours with
13 him, and he asked -- he was particularly interested in
14 the experience in America with environmental law and
15 whether it really worked.

16 I told him that I thought the
17 most valuable part of the environmental law that's
18 been worked out was the public hearing process where
19 the public was able to participate and the native
20 peoples were able to present their points of view as
21 to how this project was going to affect them, and
22 I commented upon the Government of Canada in providing
23 that similar process now here in this Inquiry which
24 has been going on and I admire so much, it's getting
25 to the little areas like Old Crow where I have been,
26 and to the smaller villages on the Mackenzie.

27 I think also it is important
28 that the government has provided financial assistance
29 to the Canadian Arctic Resources Committee to permit
30 expert independent research and the cross-examination

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1 of experts to provide an input from the environmental
2 side.

3 Well, based upon the above and
4 upon earlier research, it seems to be agreed by nearly
5 all parties to this Inquiry that there are extremely
6 important wildlife and human intangible values that
7 must be protected in the Arctic National Wildlife
8 Range of Alaska and the equivalent winter range of
9 the caribou herd in the Yukon Territory, both of
10 them shown as George has shown on that map where the
11 international boundary is just being a happenstance
12 in the middle of a total biological unit of the caribou
13 and the wolves and the other migratory animals.

14 At pages 31 to 41 of the
15 May 31, 1975 booklet on the Arctic Gas project, the
16 applicant recognizes those values, and I'll submit
17 this and table it, and concludes that:

18 "The oil and pipeline route of the Arctic
19 Gas project provides the most environmentally
20 sound transportation for Alaskan gas."

21 That pipeline of course also provides for delivery of
22 the Mackenzie Delta gas in the Beaufort Sea to
23 Canadian markets. So let us briefly examine that
24 conclusion, that it is environmentally sound.

25 Almost all the environmental
26 organizations of Canada and throughout the world --
27 and I stress, as Mr. Collins has, that this is, and
28 Dr. Thompson quoted the resolution of the International
29 Union for the Conservation of Nature and Natural
30 Resources at the conference in Banff, Canada in 1972,

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1 stressing the international importance of this magni-
2 ficent region, the finest of the entire pan-Arctic.
3 All organizations would prefer that no pipeline should
4 ever disturb the ancient unglaciated delicate ecology
5 of that portion of the Arctic coast. That is also my
6 own strong personal preference, and of the Arctic
7 International Wildlife Range Society, that Canada-
8 United States Environmental Council with many Canadian
9 environmental organizations listed in the testimony of
10 Dr. Thompson, and the Sierra Club and the Wilderness
11 Society, two very vigorous organizations in the United
12 States.

13 However, although all of us
14 would prefer that there never be either a hot oil
15 pipeline down to Valdez, nor a pipeline anywhere else
16 in this delicate country, after very vigorous debate
17 taking all those points into consideration, the
18 Congress of the United States has decided that the
19 oil at Prudhoe Bay is going to come out by pipeline,
20 and then the associated trillions of cubic feet of
21 gas must also come out at roughly the same time as
22 the oil. It can be postponed a year or so, but you
23 can't get the oil out without the gas or without
24 wasting the gas, and that is tragic under modern
25 energy crises. Whether the gas goes south to the
26 Gulf of Alaska is not a matter directly for me to
27 discuss with the Inquiry, and I believe that will be
28 presented by the representative of the Government of
29 Alaska probably tomorrow. So I express no opinion on
30 that. But as a route into Canada, in general the further

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1 the pipeline is away from the coast, the better pro-
2 tection it is for the wildlife and human values in
3 that region. That is the basic view of the three
4 members of this panel, and I think of most of the
5 environmental organizations of North America.

6
7 However, I feel as a lawyer
8 that for an expert witness to be of any real help to
9 an Inquiry such as this, the witness should be objec-
10 tive and realistic, stating an opinion based on exper-
11 ience and qualifications. Therefore I state the
12 following as my personal opinions and not necessarily
13 the view of any of the many environmental organizations
14 I have worked with.

15 First, the Fairbanks corridor
16 route which is not even on that map but shows up
17 over here, and for all those who are here, you know,
18 it's roughly to come down the same line as the hot
19 oil line as far as Fairbanks, and then at that point
20 to turn and come along mostly the route of the Alcan
21 Highway into probably Whitehorse and on east. It has
22 a great advantage of being mostly within a utility
23 and highway corridors that are already heavily
24 damaged by man. I realize that in his testimony
25 before you a number of very competent witnesses pointed
26 out that there is really no knowledge as to what the
27 cumulative damage will be when you keep adding things
28 onto wildlife and terrain that is already damaged by
29 a hot oil pipeline. I also know that technically there
30 are difficult questions both as to permafrost with hot
31 and cold pipelines in reasonably close together, and

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also because of the difference in the thermal character of the two pipelines, they will wander off quite a ways apart, sometimes many miles apart, sometimes that will be dictated by safety reasons.

The Fort Yukon route avoids intrusion into the Old Crow Indian life, which has been there for 27,000 years, by a cone that was dated that old at Old Crow, and the many migration routes of the caribou. However, I feel that most of the very lengthy northern part of the Yukon Porcupine route is still purely wilderness except for the small bands of villages that are in that area, and the route is less harmful environmentally than the three northern routes as far as the Wildlife Range is concerned, but I do not feel that the Fort Yukon route is substantially better than those.

As to the offshore ocean route, I admire the sincere diligence of Gas Arctic in following the requirements of the American law on environmental impact statements that all possible alternatives be researched and presented. So this has been researched and technically presented. To start under the sea ice from about Flaxman Island off the western tip of that Wildlife Range and then to proceed a mile or several miles offshore under the ice to the point where it joins it again in the somewhat yellow-green part of the Yukon Territory, which is to be protected, we hope, in the future. There are a lot of problems with that, as has been expressed in other testimony here, and I do not have technical knowledge as to whether

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1 it can be done; but even if it can be done, it still
2 puts the pipeline back onto land in the Yukon Terri-
3 tory, which is just as delicate and fine as that in
4 Alaska.

5 So then we come to the interior
6 route, which is shown there roughly on the map, and
7 many environmentalists feel that this route is a lesser
8 of several evils. But as with the preceding sea
9 route, this interior route also has a great value of
10 avoiding the very difficult and possibly litigious
11 issue of invasion of a dedicated Arctic National Wild-
12 life Range, and moreover as you can see, it does do
13 so through a corridor which has been expressly reserved
14 by the Secretary of the Interior for the purpose of a
15 pipeline around a National Wildlife Range.

16 However, I have concluded that
17 those benefits are outweighed by the following disad-
18 vantages:

19 1. Roads of a much higher standard are going to be
20 required because of the extreme difficulty of crossing
21 the range there, it has to cross the range at an
22 elevation of pretty nearly 5,000 feet or more, and
23 on slopes that are so steep that ice roads, snow roads
24 are just technically not feasible. In order to get
25 the heavy pipe into that area on the south side they
26 are going to have to bring it in from either the cross-
27 ing of the Alyeska Pipeline crossing the Yukon, or
28 more possibly from a circle below Dawson on the Yukon
29 which connects with the Fairbanks road map. The
30 applicant is proposing a temporary road of 375 miles

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1 from Circle clear up almost to the Old Crow, and then
2 across to the Dempster Highway at Fort McPherson.

3 A thing that many of us are
4 concerned with is that the previous administration
5 of the Government of Alaska had strongly proposed
6 that the temporary road for construction of the hot
7 oil pipeline be made a state highway, so that they
8 get all of the hunters there from Texas and Oklahoma
9 and California and other horrible places, and that
10 they would thus gain all of that money for shooting
11 our wildlife. Well, I fear that although the current
12 administration of Alaska has improved immensely with
13 respect to the dangers of that, still if you have a
14 375 mile gravel road of two feet to maybe six feet of
15 gravel to protect the permafrost, that it's going
16 to be almost politically impossible over the period of
17 the next several decades to prevent the connection
18 of the Fairbank network of roads with the Dempster
19 Highway through to that area. Then you've ruined hundreds
20 of square miles of land on all sides, as far as wilder-
21 ness and the life-style of the Old Crow Indians.

22 Long ago, Bob Marshall, that
23 great Alaskan Arctic explorer, wrote about temporary
24 roads. He wrote:

25 "Little haul road, don't you cry,
26 You'll be a highway by and by."

27 And all over the United States that has proven to be
28 true, that when you make a temporary road, it just
29 gets better and better until it's finally there forever.

30 But the technical point of

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1 wildlife, too, is that the restricted canyons in
2 crossing the Brooks Range on both sides and the fact
3 that the highway -- excuse me, haul way or road for
4 construction and the pipeline will parallel those
5 streams so closely the wildlife, caribou, grizzlies
6 or other animals do not have a chance to get away from
7 the civilization. On the gentler slopes of the North
8 Slope they can. They've got room to wander around.

So although I strongly prefer
no pipeline at all, I have concluded that if no
permanent roads are permitted on the North Slope, in
other words if the applicant as it has applied for
handles this with winter construction only, and the
amount of control that Mr. Templeton and others referred
to in the testimony on the Environmental Protection
Board so that they don't start construction before the
snow and ice roads are strong enough to hold the load,
and so they don't go on for the last two weeks of
April or whenever it's starting to get too soft, then
it is my opinion that a pipeline on the North Slope,
the prime route, would be less damaging environmentally
than any of the other routes into Canada, except the
lengthy Fairbanks-Alcan Highway route.

The reasons for my opinion are
as follows: That permanent roads and the traffic
they bear are just totally destructive of all wilderness
and much wildlife for a great many miles on both sides
of their total length, and in this connection off-road
vehicles are prohibited in so much of the country but
it just doesn't work. They still wander. Winter con-

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struction with short snow roads from barge landings on the Arctic coast to see that the prime route is close enough to the coast so that the applicant has carefully planned landings at Demarkation Bay, Camden Bay and some of the other places; any other short haul road of maybe 10 or 15 miles of snow and ice up to the route, then along the route they can distribute in each direction, maybe 15 miles each way, and dig the trench and bury the pipe.

When it is finished, in a distance of almost 500 miles, the applicant says 492.1 miles from Prudhoe Bay to the junction with the delta line at Travaillant Lake there will be a buried chilled gas pipeline out of sight, but with 30 heli-pads on the surface for control of the valves, there will be no compressors in Alaska for the period that it will operate on 2 1/4 billion cubic feet per day. The two compressors in Canada, nine landing strips of 2,400 feet, and nine landing strips of 6,000 feet, I am of the opinion that with those intrusions into the wildlife that those facilities when they're used intermittently for maintenance, would be far less harmful to the wildlife and to the wilderness of that magnificent country than the future permanent highways that would result along other routes.

Now in your hearing of May 25th, 1975, you asked that the witnesses try to set forth conditions and terms, and my conditions would be that I would recommend the prime route provided that it be constructed in winter construction only, and the

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heavy maintenance be in winter only, and that logistical support, heavy support be in winter only, so that it does not interfere with the wild fowl or with the calving of the great caribou herd which is the greatest this side of Sarangetti, and that the construction be with only snow and ice roads. In my original typed testimony before you, I referred to some miles of temporary road and three miles of permanent road and wondered what they were for. When I did more on my reading I find out that they are to connect the compressor station with the heli-pad or the air strip, little things like that, and so that they do not amount to any possibility for the State of Alaska or anybody else to try to develop the little wharves and the route into a permanent highway.

I would also request that there be no public use of the air strips or the heli-pads or the wharves. That can be prohibited, as is shown in the United States. We have some air strips in some of our wilderness areas, such as the Great Bog Marsh of Montana, a million and a half acres, and the Forest Service used to have some air strips in there for fighting fires. They don't use them any more, but the public is not allowed to use them. That is extremely important in a wilderness area or an area such as the Graham Range. You'll have a series of air strips there, six of them, which are to be used for maintenance but should not be used by the public, or else the country will be over-run.

Well, to summarize, I'll just

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1 state that the Arctic National Wildlife Range in Alaska
2 and the equivalent area in the Yukon Territory have
3 wildlife and human intangible values of great importance
4 which are recognized throughout the world. No pipeline
5 should interfere with those values if any route can
6 be adopted that will not affect them; but if no distant,
7 alternate route can be approved, then I am of the
8 opinion that the prime route proposed by Gas Arctic
9 along the North Slope is less damaging to wildlife and
10 human intangible values than the interior route or
11 possibly the offshore route, which I don't know so
12 much about. Thank you.

13 THE COMMISSIONER: Dr. Leonard,
14 putting the offshore route out of our minds for the
15 moment, because no one has come here and seriously
16 urged that it be adopted, the burden of what you say,
17 I take it, is that given the choice between the coastal
18 route and the interior route, you like Mr. Collins,
19 prefer the coastal route.

20 A That's correct.

21 Q You said something just
22 at the end of your statement that -- and I only just
23 caught it -- if there is no other distant route?

24 A I was referring to
25 the possibility of approval of the Fairbanks route,
26 primarily. I don't feel that the Fort Yukon route is
27 sufficiently better than the prime route to justify
28 the harm that would occur to that country and the harm
29 in the Canning River and in crossing the range.

30 THE COMMISSIONER: Thank you,

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Dr. Leonard.

MR. ANTHONY: Dr. Thompson, perhaps you could bring this to a close then by just describing what the Range Society has considered and any policy it has adopted with respect to the question of routes, through the Wildlife Range.

WITNESS THOMPSON: Yes. I suppose in a way I'm just reiterating what both Dr. Leonard and George Collins have said.

THE COMMISSIONER: Just pull the microphone just a little closer to you.

A The position of the Society is certainly that any routing which diverts pipelines away from the area of the range is preferred. We've all said that. I think maybe the reason was well summed up at the 1970 Conference by John D. Findlay, who at that time was the regional director of the Bureau of Sports Fisheries & Wildlife of the United States Fish & Wildlife Service when he said -- and I'm reading at page 20 of the proceedings:

"Industrialism of the Arctic National Wildlife Range would clearly be contrary to the purpose for which it was established. The massive men, materials and machinery associated with oil and gas industrialization, for example, would overwhelm the wilderness character of the range and ultimately and irrevocably destroy its unique naturalness. It would also have a profound effect on the United States international responsibilities in the management

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1 of the Porcupine caribou herd."

2 I think that I would only add a personal consideration
3 that since there are these values that are intangible,
4 that can't be expressed in dollar terms but which have
5 had a strong response from people here in the Yukon
6 residents, from people in Canada and United States and
7 even around the world, somehow or other these have to
8 be weighed against the cost savings that are the
9 principal reason for the selection of this route.

10 It strikes me as another ex-
11 ample of what may be a logical approach in purely
12 economic terms, namely, that you have a gas supply in
13 Prochov Bay and you have a market in the south, and
14 you select the most direct and least costly route to
15 get it from one place to the other. But I would
16 think, and certainly I think the members of our Society
17 believe that there are other values that deserve
18 consideration than purely the question of least cost
19 to the delivery of natural gas to markets, and we are
20 stressing then the importance in values of this area
21 and the importance then of giving serious consideration
22 to alternatives.

23 The resolutions of the Society
24 I think should be my concluding remarks about these
25 questions of possible multiple uses and priorities.
26 The conference was resolved into a number of committees
27 and one of the committees was a Committee on Purposes
28 and if I could just briefly read its statement on
29 priorities at page 76 of the record of the conference:
30

"When seeking to establish priority, the

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1 consensus was that within the area of their
2 native lands, first priority should be assigned
3 to the use of the Old Crow Band, and the Coastal
4 Eskimo. Outside those areas the wildlife values
5 should receive primary concern."

6 Then on the resolution respecting uses that might be
7 permitted within the range -- and I think I mentioned
8 in my original statement that there was a realistic
9 appreciation of the fact that there were outstanding
10 petroleum permits and that there were resources which
11 in the interests of society might have to be developed.
12 So the resolution on uses reached this conclusion:

13 "The conference resolved that the uses which
14 society as a whole make of the area including
15 research, interpretation of natural and pre-
16 historic culture of phenomena, wildlife and
17 fisheries management, petroleum and mineral
18 development, pipelines and other transport
19 routes, disposition of surface deposits such
20 as gravel, and support of hunting and sport
21 fishing may be permitted on the range as will
22 be determined by the Management Authority
23 under such restrictions and regulations as
24 are necessary to maintain wildlife population
25 and safeguard the traditional life of the
26 native people."

27 So that certainly the position of the Society is that
28 any routing away from the range is preferred; if it
29 is ultimately necessary that a pipeline cross the range,
30 the conditions under which that occurs must be such

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1 as respect the native uses that have been traditi_ onally
2 established, and these other very important values of
3 the area as a wilderness area.

4 THE COMMISSIONER: Thank you,
5 Dr, Thompson.

6 MR. ANTHONY: Thank you, Dr.
7 Thompson, and panel. That concludes the evidence in
8 chief and these gentlemen are available for any questions
9 from my friends. I can say that should any problems
10 occur in timing, Dr. Thompson is available to call
11 back. I'm afraid the other gentlemen are a little
12 too distant at the time, but are all available now for
13 any questions my friends might have.

14 THE COMMISSIONER: Well, Mr.
15 Marshall?

16 MR. MARSHALL: Just a few
17 brief questions for you, Dr. Thompson.

18
19 CROSS-EXAMINATION BY MR. MARSHALL:

20 Q I take it from the evid-
21 ence of the panel that really the efforts to get the
22 range established in Canada, or internationally, is
23 well over 20 years old. This is really nothing new in
24 terms of a proposal. It's been reactivated recently, but
25 the history of it goes back right to the early '50's.

26 WITNESS THOMPSON: The history
27 of the proposal in United States certainly goes back that
28 time, 20 years. I'm sure that George or Dick could
29 elaborate more than I can on earlier approaches to the
30 Canadian Government, but what I'm suggesting is that

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1 no really serious proposals were carried forward in
2 Canada until the 1970 Conference.

3 Q I see. I didn't think
4 anything, let alone a mere lawyer, would render you
5 speechless.

6 A I took a drink of water
7 and I guess it went down the wrong way. It's not
8 likely to last for long.

9 Q The old law professor
10 in him is coming back. There were a couple of remarks
11 both in the prepared evidence and in the comments that
12 were made by the panelists about the range area and
13 the proposed extension being self-contained or a total
14 biological unit. Really just as a matter of clarifica-
15 tion, isn't that really a bit of an over-statement in
16 the sense that the range really doesn't contain, say,
17 the total wintering area for the Porcupine caribou
18 herd, and in terms of the bird life or avifauna it's
19 migratory -- to a large extent migratory birds that
20 use it, and it's not a self-contained biological unit.
21 It's something else. Can you comment on that, sir?

22 A Yes. I would like to
23 comment on that. I think that George has already com-
24 mented on that. What you're saying is that nature
25 systems are a continuum and you could keep going around
26 the globe in every degree of the circumference. What
27 we are talking about here is trying to identify areas
28 that maybe can be considered to be more significant
29 than other areas and we think that a combination of
30 things about this area make it particularly significant

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1 With respect to the caribou, if we wanted to include
2 their entire habitat and also to take account of the
3 -- what did you call it, interdigitation -- we would
4 have to cover the whole of Alaska and the Yukon. What
5 the range area does include, though, is the calving
6 area, and I think that in the migration of the caribou
7 that is probably as critical as anything else, and
8 that gives a special feature to the area.

9 Q That particular area
10 being along the coast?

11 A Along the coast.

12 WITNESS LEONARD: I might
13 say that I think it's also important that there's an
14 unglaciated area so that many species of plants and
15 animals that were wiped out in the Canadian Shield
16 and clear down to the Ohio River were left up there
17 because of the fact that the Arctic was pretty much a
18 desert and people think of the glaciers as being all
19 over Alaska, but they weren't; and this area was not
20 glaciated so it's an important area for that reason
21 because some of the life there, both animal and plant,
22 has been there for many many hundreds of thousands
23 of years, and elsewhere in Canada have not had that
24 opportunity.

25 THE COMMISSIONER: You're say-
26 ing that this area in the U.S. and the Yukon on the
27 map was never glaciated so it tells us today what that
28 country was like before the Ice Age, in larger measure
29 than we shall ever know from other areas of the
30 Arctic.

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1 A That's correct as to the
2 Arctic. Now of course the Brooks Range was heavily
3 glaciated, but in 'valley glaciers that extended as
4 tongues and not in the great areas that we had in the
5 interior of Canada and northern United States. But
6 particularly in the area of the Yukon Territory is
7 most important, that was unglaciated and shows up very
8 beautifully in the magnificent 30,000 pages of the
9 Biological Reports of Gas Arctic have prepared for
10 that area, and the Canadian Wildlife Service.

11 WITNESS THOMPSON: I would add
12 I'm not a natural scientist but it tells us a lot,
13 not just about that area, but because you have contin-
14 uous genetic evolution over such a long period of
15 time, it tells you in a universal sense important things
16 so that to the scientist an unglaciated area with
17 species that can be traced back over that period of
18 time can make significant contributions to our under-
19 standing of the whole biological process.

20 MR. MARSHALL: Q Dr. Thompson,
21 --

22 THE COMMISSIONER: Yes, excuse
23 me, Mr. Collins wished to add something.

24 WITNESS COLLINS: I want to
25 rise to a point, too. You notice, if you recall my
26 description of how Dr. Sumner and I happened to get
27 in there, there's a certain flow and symmetry to our
28 original boundary up the Canning and across Old Woman
29 and around from point to point on those mountain
30 peaks along the south-west -- south-east side of the

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1 range in Alaska, and then warping around through the
2 Yukon, eventually to come back up the coast. There's
3 a certain symmetry there, and I mean by that that we
4 were well aware that we were not encompassing the
entire range of the Porcupine caribou herd, or some
other species, and certainly no migratory ones that come from
very long distances but where are you going to stop?
You try to be as conservative as you can, leaving some
8 things trusting other people who have responsibility
9 for adjoining land. Say this had been established, this
10 is one of the greatest International Parks of all time.
11 Those properties along the edges who over for a ways
12 which might support winter caribou range, winter caribou
13 life and other things, they don't necessarily have
14 to be in the park itself; but you rely upon other
15 agencies to respect the main point of view, the main
16 centre of interest and then utilize perhaps on a somewhat
17 restrictive basis, but nevertheless being aware
18 so that you don't come right up to that line and then
19 suddenly change to a different land use or a different
20 point of view. There has to be, again I'll use the
21 word "interdigitation" of ideas and policies and idealism,
22 you see. I'm trying to say something here that
23 will reveal how you can or should be conservative as
24 you can, relying upon understanding on the part of
25 other people. It takes a lot of education, a lot of
26 doing, and when you have an international boundary
27 cutting right through the middle of a great physiographic
28 unity, you have two nations to be concerned,
29 and I just hope again that where I am in the nation
30 I'm visiting at this point there will be a surge of

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1 | tremendous interest in developing a thing on your
2 | side of the line.

3 | I had to make that point, Mr.
4 | Commissioner.

5 | MR. MARSHALL: And you've
6 | made it well.

7 | Q Dr. Thompson,
8 | there is reference in your evidence to establishing
9 | a status similar to that provided for the National
10 | Wildlife Range in Alaska, and I believe in your last
11 | point that you were mentioning probably covered this;
12 | but as I understand the legislation that establishes
13 | the Arctic National Wildlife Range in Alaska, that it
14 | is the -- the secretary is authorized under regulations
15 | to permit certain land uses, among which may be pipe-
16 | lines. Has that really what the Society had in mind
17 | in reaching the conclusion that you last referred to
18 | about the various land uses that might be permitted
19 | under appropriate regulation?

20 | WITNESS THOMPSON: At the time
21 | of the conference in 1970, there was nothing to --
22 | there were no regulations that I know of to which you
23 | would be referring.

24 | Q I was referring to the
25 | National Wildlife Refuge System Administration
26 | Act of 1966, in the United States.

27 | A Well, I defer to --

28 | Q I don't have the legisla-
29 | tion with me, but the section of it I have reads in
30 | part as follows:

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1 "The Secretary is authorized under such regula-
2 tions, as he may prescribe to,"
3 there's a sub-section (1), and a sub-section (2) is as
4 follows:

5 "(2) permit the use of or grant easements in,
6 over, across, upon, through, or under any areas
7 within the system for purposes such as but not
8 necessarily limited to power lines, telephone
9 lines, canals, ditches, pipelines and roads in-
10 cluding the construction, operation, and main-
11 tenance thereof, whenever he determines that
12 such uses are compatible with the purposes for
13 which these areas are established."

14 I was just wondering whether such legislation was in
15 the minds of your Society when you were talking about
16 the possible uses that might be permitted in the pro-
17 posed extension in Canada?

18 A Was that legislation
19 applicable to the public domain lands in general in
20 the United States?

21 Q It's my information and
22 my instructions it was applicable to this particular
23 range.

24 A The Wildlife Range was
25 created by an executive withdrawal, and that withdrawal
26 has the effect of excluding disposition under the
27 Public Domain Land laws and regulations made there-
28 under, and probably the regulation to which you refer
29 would fall in that category. At the time of the
30 conference, John Findlay, who was the senior U.S.

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1 Government administrator responsible for that area,
2 gave a description of the effect -- the legal status --
3 I'm referring to page 16 of the proceedings, he said:

4 "The range is open to the mineral,"
5 let me go back.

6 Q Well, perhaps --

7 A What I can tell you what
8 he said was that, I'll give you a synopsis, was that
9 the area had been withdrawn. There could therefore be
10 no dispositions under the Public Lands Act. There
11 could be no mining rights acquired. However, the
12 executive withdrawal accepted the operation of the
13 Mineral Leasing Act because there were oil interests
14 expressed in the North Slope, resulting from the war-
15 time petroleum explorations. It does mean that
16 there could have been oil and gas leasing, but --

17 Q I think we might get
18 into endless legal discussion about it, but you're
19 looking at, referring, I suppose, to Public Land Order
20 2214 which, as I understand it, set up the range and
21 talked about the purposes under paragraph 1:

22 "For the purpose of preserving unique wildlife,
23 wilderness, and recreation values,"
24 and it does, as you indicated, make withdrawals, and
25 says:

26 "Withdrawn from all forms of appropriation
27 under Public Land laws, including the mining,
28 but not the Mineral Leasing laws nor disposals
29 of materials under the Act of July 31, 1947
30 as amended."

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1 So I can refer you to that.

2 A Yes,

3 Q I was just wondering
4 though, you're not familiar with that specifically?

5 MR. ANTHONY: Mr. Commissioner,
6 I wonder if I may just interpose here? I think that
7 it's always a danger to have lawyers on a panel and
8 lawyers asking questions, but I would suggest that
9 perhaps a discussion of what the current law is and
10 whether the law that Mr. Marshall has dug up is in fact
11 the governing legislation or not, requires some form
12 of legal analysis and legal opinion, which I don't --
13 which I imagine we can get into but I would suggest
14 that it may not get us very far. It may just result in
15 the legal opinion of some particular people here.

16 MR. MARSHALL: I think there
17 is a point, and it probably should be made, and we can
18 perhaps make it with this panel, or we may make it
19 with other witnesses that could be called, and that
20 really relates to the status of the range in Alaska.
21 Is it park or is it something else? We are perhaps
22 twice blessed or at a double disadvantage having two
23 lawyers on the panel. Dr. Leonard is, I'm sure,
24 familiar with the legislation. Perhaps he could speak
25 to it.

26 MR. ANTHONY: Before Dr. Leon-
27 ard does, I'd like perhaps to hear what he has to say.
28 I suggest if Mr. Marshall is presenting a situation of
29 what the law is, and if he has the regulations appli-
30 cable, that he file them or make them available to this

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Inquiry and we can all judge what the governing law
is.

MR. MARSHALL: Well, I can
simply ask this question of Dr. Leonard.

Q Is the secretary author-
ized to permit the granting of an easement for a pipe-
line across the Wildlife Range?

WITNESS LEONARD: Yes, when
the matter was settled in 1973 by the special Act of
Congress, which established the right of the Alyeska
Pipeline to go forward with their application, you
see the Courts of the United States on the application
of the Wilderness Society, of which I've been a member
of the Board of Directors for 28 years, stopped the
pipeline for four years because they did not comply
with the Mineral Leasing Act; and that decision was
upheld by the Supreme Court of the United States by
refusing to hear the unanimous decision of the Appellate
Court which upheld the decision in favor of the Wilder-
ness Society.

So then Congress took it into
its hands and passed the amendment to the Mineral Act,
which provides very simply that rights-of-way through any
federal lands may be granted by the Secretary of the
Interior for pipeline purposes. The next paragraph is
definitions:

"For the purposes of this section federal lands
means all lands owned by the United States except
lands in the National Parks system,"

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for the reasons that George pointed out.

"Lands held in trust for Indians or Indian tribes,"

which is of interest to the native peoples here,

"and lands on the outer continental shelf."

And the reason for the exclusion of the oil lands on the outer continental shelf is because that's a very complex question which is handled by Congress in a special Act on that matter.

So getting back to this,

"All lands in the United States held by the Army, Navy, or anybody except National Parks or Indian lands, can be granted."

Then it goes on to say:

"A right-of-way through a federal reservation," which this is,"

"shall not be granted if the Secretary determines that it would be inconsistent with the purposes of the reservation."

Now you'll see that the regional director of the Fish & Wildlife Service of the United States stated in the 1970 Conference that he felt that a pipeline would be inconsistent with the purposes of a reservation; but that gets back to a very involved subjective question which would have to be solved at some later time. But I would not propose to raise it myself because I feel that to raise the question would simply force the pipeline into a worse position on the interior route.

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3 THE COMMISSIONER: Well, I
4 think that Dr. Leonard has succinctly put an end to
5 this argument for the time being. At least I hope he
6 has.

7 MR. MARSHALL: He certainly
8 has to my satisfaction, sir.

9 Q Perhaps Dr. Leonard
10 could tell us if there are other uses permitted or
11 other activities permitted in the Wildlife Range,
12 for example, that would not be allowed, say, in a
13 park, just to give us some better idea of the status
14 of the range. I was thinking, for example, of hunting.

15 A Hunting is permitted,
16 and in fact the wildlife agencies you'll hear tomorrow
17 from the director of planning for the State of
18 Alaska who was professor of wildlife management at
19 the University of Alaska and one of the top authorities
20 on caribou and other game animals, and it's my
21 understanding that most game management people feel
22 that management of game is important, and of course
23 it has always been considered that the Old Crow and
24 any other native peoples could always hunt for
25 subsistence purposes within any of the Wildlife
26 Refuges, and that is normally permitted also.

27 THE COMMISSIONER: Well, you
28 say hunting for management purposes, that is to manage
29 the herd?

30 A Yes.

Q In the event of over-

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population and so forth, and hunting by native
peoples for food.

A Correct.

MR. MARSHALL: Q There is
sport hunting in the range, is there not?

A I am not sure.

Q My information is --
perhaps Mr. Collins can comment on this.

WITNESS COLLINS: There is.

Q In fact it's year-
around, open season on caribou, isn't it?

A I couldn't answer that.

WITNESS LEONARD: Dr. Weedon
could give you an expert opinion on that.

Q Mr. Collins, there was
a point that I believe you mentioned. I may not have
caught you properly. When you were going through the
map you commented about the interior route impinging
upon the range in Alaska. Did I catch you correctly?
Just looking at your map it seemed to me that it
didn't impinge upon it, it seemed to be in that
utility corridor between the range and the proposed
Wildlife Range extension that you've outlined there
and hatch-marked.

WITNESS COLLINS: It would
impinge upon the range as projected for enlargement.

Q I see.

A That's what I meant.

Q That's that -- I see,
the area that you have designated with the green

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letters marked with the arrow.

A That's correct, the right-hand side at least. This being so diagramatic I wouldn't know whether it impinged elsewhere or not. However, suppose you had the pipeline in the Canning River Valley; impingement, in my thinking, wouldn't necessarily require an actual physical contact.

Q Right.

A You would be some distance away and still the affect by association would be almost the same as though the line were just inside or something like that.

Q I wasn't clear of the way in which you were using the term.

A Yes.

Q Getting back to Dr. Thompson, you've included in your prepared evidence under paragraph 10, the Washington resolution of March 5, 1975, of the Canada-United States Environmental Council, and on going through the recitals and particularly the second paragraph, the statement is made -- and I'll just read part of it:

"The Canada-United States Environmental Council believes that current proposals to transport gas from Prudhoe Bay to the lower United States across this area would cause unacceptable damage to these values."

I've looked carefully at the list of studies and reports appended to the evidence of the panel and I

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can't see any studies and reports and so on that tie in with this particular point. I was wondering whether at the meeting in Washington there were special studies dealing with this issue that were presented, and if so, if they might be identified for us?

WITNESS THOMPSON: I was invited to attend that meeting as a representative of the Society but was unable to be there, and there were no other representatives of the Society at the meeting. Therefore I am really not in a position to say what they had before them. If you look at the list, though, it represents certainly major conservation organizations in the United States who would have many resources to draw on, and beyond that I can't say anything.

Q Do you know if the Canadian Wildlife Federation supported the resolution? I don't see them listed with your list of sponsors.

A I don't know more than what I see there.

Q I see. You don't know whether the National Wildlife Federation of the United States supported the motion either?

A Again I don't see their name present so I don't know whether they were at the conference or not.

Q I guess my concern is that being a lawyer, as you are, I've attended meetings of Canadian Bar Associations and local Bar Associations, and I know how some resolutions go through, and

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1
2 it always makes me a little suspect of it. They seem
3 to hold these sessions where the resolutions are
4 presented the morning after the banquet, and the
5 attendance is somewhat light, and the keen supporters
6 happen to be there but it seems that there aren't a
7 great deal of others.

8 MR. ANTHONY:

9 Might I suggest that the
10 Canadian Bar is probably not a guide for anything and
11 certainly not a guide for a meeting of the --

12 A You mean it's misguided.

13 MR. MARSHALL: We lawyers just
14 take nothing but abuse at these proceedings.

15 A I would just respond,
16 though, that knowing something about these groups and
17 the people in them, and knowing how strongly they feel
18 about that area, I'm not surprised to see this resolu-
19 tion.

20 Q But this is a public
21 Inquiry and a serious one, and we've had a great deal
22 of technical evidence, and we'll have a great deal
23 more. Now you're putting forward as evidence a resolu-
24 tion of an organization, of a meeting that you did not
25 attend, and you've listed nothing which underlines and
26 forms the basis of one of the recitals in this resolu-
27 tion -- and I think a key one so far as the interests
28 you're representing and those I'm representing. I
29
30

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1 think it's fair to ask, "What underlies that statement?"
2 Can you tell me sitting there what is the basis of the
3 statement other than some emotional feelings that
4 some of the delegates may have had? If there^{was} something
5 concrete in their studies, specific studies underlying
6 that I'd like you to tell me about them.
7

8 A Well --

9 Q I'd like to have a look
10 at them.

11 A -- they have recorded the
12 proceedings of our conference, the studies they have
13 research that's done in that area. They have reports
14 of the Bureau of Sports Fish and Wildlife concerning
15 the administration of the range. That's put forward
16 for a very good reason. You referred to this as emotional
17 support. In effect, it's the very emotional barometer
18 that we're really gauging, there's no alternative to
19 determining whether or not we have a value here in
20 terms of dollars and cents. There's only an alternative
21 in the sense that people who are sensitive to these
22 things and who are informed and who take the trouble
23 to read and study about it, develop a sense that, "Here's
24 a real value, a value worth doing something about."

25 Now what we have done here
26 is included this resolution because it shows important
27 national organizations in Canada and in the United States
28 and shows that from their experience in the conservation
29
30

Thompson, Leonard, Collins
Cross-Exam by Marshall

movement, in the naturalist movement, they place a
real value on this area.

Q I guess, Dr. Thompson,
we get to the point that I'd like you to be able to
provide me with some of the backup that was presented
in support of that resolution, if that is available.
If it's not, I'll accept that. But if there is, we
are interested in having a look at it.

THE COMMISSIONER: I think
that's a reasonable request. Do you agree to that,
Mr. Anthony?

MR. ANTHONY: Well, certainly
the Canadian Arctic Resources Committee is a signature
to that resolution that was represented at the confer-
ence, and unlike apparently the oil companies, we seem
to communicate with each other and I'm sure that
the range people who are here would be able to talk
to the CARC representatives and ensure that the material
is available, and I'll undertake to file whatever
material is available to them with this Inquiry.

A I might add, sir, that
one of the functions of the Society has been to try
to compile a bibliography, an index of all of the
material about the area. This effort has been directed
to material outside of that that is currently being
prepared by governments and by the applicant companies
because we know that that is being well-indexed other-
wise. The fact is that there's not a great deal of

Thompson, Leonard, Collins
Cross-Exam by Marshall

1 hard research, the remoteness of the area, some of
2 that which is available is included for example
3 archaeological studies is fully documented in this
4 document. We have the studies of Dr. John Lambert,
5 who has done probably more in the way of work respect-
6 ing flora in that area than anybody else. But in
7 fairness, there's a great deal of documentation that
8 just doesn't exist.

9 MR. MARSHALL:

Well, what does exist

10 I take it from Mr. Anthony's comments, we'll be
11 receiving and perhaps we can chat about this again
12 with you at a later date. Thank you, sir. Those are
13 all the questions I have.

14 THE COMMISSIONER: Thank you,
15 Mr. Marshall. Mr. Hollingworth?

16 For the benefit of the people
17 from Whitehorse here tonight, Mr. Marshall, who was
18 just questioning the witnesses, represents Arctic Gas.
19 Mr. Hollingworth represents Foothills Pipe Lines.

20
21 CROSS-EXAMINATION BY MR. HOLLINGWORTH:

22 Q Dr. Leonard, I think that
23 all my questions will be addressed to you, and I've
24 listened with interest to your statements tonight, and
25 you discussed each of the corridors that have been
26 discussed all this week by the Commission, specifically
27 the Fairbanks corridor, the Fort Yukon corridor, the
28 so-called prime route and the interior route, and
29 I have to agree with the Commissioner, we can probably
30

Thompson, Leonard, Collins
Cross-Exam by Hollingworth

put aside the offshore route for the time being. So considering the first four, I understand that your clear choice of those four would be the Fairbanks route, is that right?

WITNESS LEONARD: You're speaking to me?

Yes sir.

A Yes.

Q And I detect from the tone of your evidence that the only possible objection you see to it is the cost involved in taking a more circuitous route; is that correct too?

A That is correct.

Q And environmentally there is no question in your mind that it is the clearly superior route of the four?

A I have pointed out that some experts feel that there is a cumulative synergistic effect where the effects multiply. I feel, however, that that is less damaging in an area that is already damaged by the hot oil line, and by the highway, than it would be in an entirely virgin area such as the interior of the coast, or the Old Crow route.

THE COMMISSIONER: Well, could I ask you, Dr. Leonard, assuming that considerations of cost for transporting Prudhoe Bay gas to the United States via all of these routes were equal, are you saying that you would favor the Fairbanks route over any of those other routes?

Oh, very strongly. Yes sir.

Thompson, Leonard, Collins
Cross-Exam by Hollingworth

The land is already damaged and maybe "damage" is too strong a word to use. You suggested before we shouldn't use prejeratives, but still it is already changed, I guess is the more accurate way to say it, because change is for the benefit of many people, it's for the benefit of some of the animals. When you cut timber, you provide food for moose and for deer, and so there are changes for good and bad.

Q Is that your view too, Mr. Collins? I want to make sure I understand both of you gentlemen before you leave us.

WITNESS COLLINS: Yes, I would agree with Dr. Leonard's premise here.

Q That you, given a choice of these routes, you would prefer the Fairbanks corridor. Just as Dr. Leonard said, yes.

THE COMMISSIONER: All right.

MR. HOLLINGWORTH: I wonder if I might ask you gentlemen to answer a question which all the other witnesses have successfully avoided thus far this week. We've been talking about quantifying various choices, and let's take the old 1 to 10 scale again. If I can be heard over the snickers from the rear here, I wonder, sir, Dr. Leonard, if I might address this to you, if you might scale each of those four corridors on a 1 to 10 scale, if that is possible for you to do, with 10 as your most favorable choice.

WITNESS LEONARD: Well, I

Thompson, Leonard, Collins
Cross-Exam by Hollingworth

1 think on that basis that you have to classify the
2 Fairbanks route as No. 10, that the Yukon route might
3 be 7, and the interior route may be 5, and the prime
4 route about 4. You'll never get down to 1.
5

6 Q I had understood you
7 earlier to say that your preference was the prime
8 route over the interior route.
9

10 That's correct.

11 Q And you're now saying
12 you would rate the interior route as 5 and therefore
13 preferable to No. 4, the prime route.

14 A I'm sorry, I misunderstood.
15 My mathematics is wrong. I maybe a lawyer but not a
16 mathematician. I'm sorry, no, I would rate the
17 interior route as being the less favorable, primarily
18 because of a permanent highway which I fear would be
19 politically required along that route. However, I
20 would never state that the prime route was the pre-
21 ferred route of all of them. It's just that it is
22 less damaging than the interior route.

23 Q Well then, taking this
24 reconsideration into effect, what number would you
25 assign to each of the prime route and the interior
26 route?

27 A Well then, on that basis
28 I would assign No. 5 to the prime route and No. 4 to
29 the interior.
30

Thompson, Leonard, Collins
Cross-Exam by Hollingworth

Q All right, Mr. Collins,
does that coincide with your views, or would you have
a different view?

WITNESS COLLINS: Well, I am
unable to cope with the vagaries of the legal mind,
sir, and I prefer not to answer.

(LAUGHTER & APPLAUSE)

Q Well, if all of our witnesses
said that, we'd have wound up a long time ago.

MR. ANTHONY: You can see
why we required Mr. Collins when we were going to have
two lawyers on the panel.

MR. HOLLINGWORTH: I wonder if
Dr. Thompson is willing to take a stab at it?

WITNESS THOMPSON: Just to
boggle the legal minds, I refer you to the transcript
of the proceedings, it includes a presentation entitled:

"Some economic and social implications,"
that was prepared by Dr. Peter H. Pierce, who is a
noted resource economist, currently the Royal
Commissioner undertaking an enquiry into the forest
industry in British Columbia, and noted for his
contributions to the questions of how you value non-
price resources. So that for example he has done
a study to show how much in dollars and cents the
elk herds in the south-eastern part of British
Columbia are worth to the economy of British Columbia.
So if you want to get instructions on how to approach
this subject, you can read his article along with a

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lot of other literature.

Q And do I gather from
that that your answers would be exactly what Mr.
Pierce would provide me with?

A He doesn't give you
any answers. He talks about the methodology.

Q Are you saying to me
in a roundabout way, sir, that you choose not to
give an answer as well?

A Well, I certainly can
tell you a scale. I agree with the route preferences
that have been expressed, and I'm not sure it's
useful to assign these numbers. I would assume that
we put the Fairbanks one at 10, and the least desir-
able one, the interior route, at zero. Now where
do you want the others put in between? I would put
the others below five. In other words I would indicate
a high margin of preference for the Fairbanks route
from an environmental point of view, a high margin.

MR. HOLLINGWORTH: That's what
I was interested in, thank you. Those are all the ques-
tions.

THE COMMISSIONER: Well, I
think we'll stop for coffee and that will take us 10
or 15 minutes, and then we'll carry on, and I should
say to the members of the public what I said earlier,
that after coffee if any of you wish to speak,
please feel free to do so. I know that you may not

Thompson, Leonard, Collins
Cross-Exam by Hollingworth

1
2 be used to speaking with a crowd like this, but just
3 speak to Mr. Waddell during the coffee break; or to
4 me, and we'll arrange for you to have a chance to be
5 comfortable after the break and to say whatever you
6 wish; and I want to make it clear that while we enjoy
7 having these experts such as these very distinguished
8 people on this panel, as far as I'm concerned the views
9 of people who live here, who know this country are
10 just as important as the views of these experts, and
11 I don't think they would dispute that.

12 So if you wish to speak your-
13 selves after coffee, please feel free to do so and we
14 will still be here tomorrow night at eight o'clock to
15 hear any of you who may feel that you'd rather wait
16 until then to speak. But I leave it entirely up to
17 you and if you wish to speak after coffee we'll certainly
18 give you an opportunity then.

19 I'm afraid we're not through
20 with you, members of the panel. There are some other
21 lawyers who may wish to cross-examine. But we'll have
22 our coffee now.

23 (PROCEEDINGS ADJOURNED AT 10 P.M.)

24 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

25 THE COMMISSIONER: I can't
26 imagine that counsel have any -- have very many ques-
27 tions for this panel, but I can hope. Well, we
28 finished with you, Mr. Hollingworth. Mr. Bayly?

29 MR. BAYLY: Not very many.
30

Thompson, Leonard, Collins
Cross-Exam by Bayly

THE COMMISSIONER: I think
these people will be easier on the panel than the
members of the public have been.

CROSS-EXAMINATION BY MR. BAYLY:

Q Gentlemen, when you were
rating the four corridors -- and I don't want to get
back into the number scale -- you had suggested that
in order of preference they were the Fairbanks, and
the Fort Yukon, the coastal and the interior. Am I
correct, Mr. -- Dr. Thompson?

WITNESS THOMPSON: Yes, that's
correct.

Q Now, this rating, I
understand, is in the absence of any permanent road
on the North Slope, is that correct?

A Yes, I believe that we
would all agree that there should not be a permanent
road under -- in any case.

Q All right. Should a
North Slope permanent road be needed to construct
a facility on the prime route, would your rating
change? Would your order of rating change?

A I'm sort of in the
same difficulty as I noticed earlier. If you mean
that there would be no such road required for the
interior route, but a road would be required for
the coastal route, then I suppose it tips the
scale in favor of an interior route. But you know,
we're talking about things we're opposed to.

Thompson, Leonard, Collins
Cross-Exam by Bayly

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Q I understand that. Am

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A Yes, it would do that.

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The other thing is that I would believe that such a road would only come if it were presumed that there was to be development to follow, because I can't imagine a road of that -- you know, in that area at that expense being built for any other reason than development. So --

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Q All right now, given

that/^{the}question has come up and it has been brought up by your own counsel yesterday regarding the possibility of an oil pipeline following a gas pipeline along the North Slope,^{do}/you see that as raising the greater possibility of a permanent road or permanent roads for the various facilities having to be built?

23

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A I don't like to answer

for all three. I find it difficult to believe that there could ever be a situation in which a hot oil pipeline could be compatible with what we are seeking, and I would find myself against it. In fact I think because I haven't yet been shown by experts

Thompson, Leonard, Collins
Cross-Exam by Bayly

anything that would make me believe differently than
what our preceding witness said, namely, that a
hot oil pipeline with the likelihood of a spill
creates intolerable hazards.

Q All right. Then
without --

A I'm speaking for myself
in that respect.

Q -- without rating it
on the number scale then, would it be fair to say that
the opinion of this panel is that despite the evidence
which has gone in regarding differences in cost, that
the Fairbanks corridor is by far the most preferable
over the other three possibilities that have been
outlined?

A I would say that, but I
would like you to ask each of the panel members rather
than have me speak for them.

Q All right then, do the
other panel members have any opinion that would dif-
fer from that of Dr. Thompson?

WITNESS LEONARD: I feel
even more strongly, that I do agree that there is
a psychological and political reason for following a
permit for a gas pipeline with a permit for a

Thompson, Leonard, Collins
Cross-Exam by Bayly

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2 hot oil line. A hot oil line would have to have a
3 permanent road for maintenance and a pad of gravel
4 along the line for the construction and handling of
5 it. Also it would have to have, of course, summer
6 security and patrol, and very rapid repair require-
7 ments, so that I would feel that the hot oil possi-
8 bility is a real danger to the North Slope. However,
9 we can also see that hot oil would not come down
10 the Fairbanks route as a separate line from the exist-
11 ing Alyeska Pipeline. So that the oil from the Beau-
12 fort Sea or from the oil that's already discovered at
13 the delta has to come out probably either by pipeline
14 across the Beaufort Sea to the Prudhoe line, or directly
15 through some route through Canada, which seems to be
16 somewhere in the Mackenzie Delta -- not delta, but I
17 mean the Mackenzie Valley.

18 I think that we're getting
19 to a point here where they're not quite equal choices
20 any longer because of the fact that the hot oil
21 is not a possibility on the Fairbanks line. There's
22 another hot oil line.

23 Q So you envisage a
24 situation of recommending that the Fairbanks corridor
25 be used for a gas line, but that that would be imprac-
26 tical for an oil line.

27 A It would be impractical
28 mostly for economic reasons that any oil developed,
29 as seems that quite likely will be developed in the
30 Attat (?) line at Camden Bay would, to my
mind, certainly go a rather short distance, about 150

Thompson, Leonard, Collins
Cross-Exam by Bayly

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3 or less, it probably would be much less than that,
4 around 95 miles to the Prudhoe Bay line of Alyeska.
5 So they would go west. So what we're talking about
6 are the artificial islands/^{that} I saw the day before
7 yesterday in the Beaufort Sea and those are far
8 enough east so that they realistically would be
9 joined up with the oil that is already discovered
10 at Tuktoyaktuk and some of the adjacent wells.

11 I saw them from the air,
12 and one thing I'd like to comment is that many people
13 have been deeply disturbed by the damage in Alaska
14 and in the Mackenzie Valley by the old seismic lines
15 which were run without much thought, and without
16 knowledge, either. Maybe we might say they were
17 innocent in those days and naive, but I was impressed
18 by the fact that the oil pads in the delta were very
19 nicely handled with very little damage that is visible,
20 and without long lines. There are lots of, of course,
21 seismic lines up there, but I also noticed that those are
22 starting to disappear with a rather random replace-
23 ment of some of the willows and other small things,
24 and as you got further south below Inuvik the
25 start of spruce and other things is coming in.

26 I realize the tall spruce
27 would not be permitted, but some of the line will
28 start to cover.

29 Q And the other panel
30 members, sir, Mr. Collins, do you agree with the
opinion expressed by your two colleagues on the panel?

Thompson, Leonard, Collins
Cross-Exam by Bayly

WITNESS COLLINS: I am just going to ask you to let me pass this one. I get lost with these hypothetical long-range speculative things to the point that they're not germane to my approach to the problem and I just don't want to be bothered.

(LAUGHTER & APPLAUSE)

Q All right, let me bother you with just one more. Do you think that your --

A Within my competence, anything you ask me I'll try my best to answer; but don't ask me for answers to something I don't know anything about, and moreover don't care much about.

Q All right. Does your proposed Wildlife Range, could you envisage that with a permanent road through it, or would that destroy it in the concept that you have of it?

A Did we, when we envisioned the International Park, at the outset -- are you asking me if we envisioned it with a road? We wanted no road, no road whatever.

Q So if a road were built along with a facility, that would change it from the concept you originally had of it.

A Oh yes, of course that concept has been changed already, from a National Park, which -- or an International Park, which would be a highly restrictive land use form, to a National Wildlife Refuge, which is much less restrictive.

Q From your prepared evidence and the prepared evidence of Arctic Gas, it appears to me that you both recognize that the North Coast of the Yukon and Alaska have some very important wildlife values and other natural features. From this point, your Society appears to say that if a gas pipeline is necessary and has to cross the North Slope, you would prefer that it actually do take the prime route of the applicant. The applicant

Thompson, Leonard, Collins
Cross-Exam by Veale

1 states that a gas pipeline is necessary and therefore
2 they propose to go across the North Slope. Now in
3 paragraph 10 on page 6 of your prepared evidence,
4 you've quoted the resolution of the Canada-United
5 States Environmental Council. That states that
6 current proposals to transport gas from Prudhoe Bay
7 to the lower United States across this area, referring
8 to the Wildlife Range, would cause unacceptable damage
9 to these values. The Canada-United States Environ-
10 mental Council is therefore opposed to any method of
11 transport of natural gas or petroleum from Prudhoe
12 Bay or other parts of Alaska which requires the cross-
13 ing of any part of the Arctic Wildlife Range and its
14 proposed extensions.
15

16 Now your Society has not
17 endorsed that particular statement in your prepared
18 text, and my impression of what you stated tonight
19 would indicate that you do not endorse that in those
20 terms. Is that a fair statement?

21 WITNESS THOMPSON: I think
22 that in the tenor of the conference resolutions, which
23 are still the official statement of policy, we could
24 not support a statement that said that no matter what,
25 we were opposed to a pipeline. Just because the
26 applicant says gas is necessary doesn't mean that
27 the crossing of the range is necessary. Just because
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Thompson, Leonard, Collins
Cross-Exam by Veale

the applicant says gas is necessary doesn't make it
necessary, that it must reach markets.

I suppose what you're facing
with, among the three of us, are maybe somewhat tired
and somewhat in their experience jaded and therefore
realistic people in the sense that we know that there
can be situations in which despite our wishes, des-
pite the wish of all the members of the Society, some-
one is going to say, "There's a pipeline and it's
going to go there." All we're saying is if it comes
to that situation, we're expressing an opinion in
favor of the coastal route rather than the interior
route. But we don't want a pipeline there.

WITNESS LEONARD: I fully
agree.

WITNESS COLLINS: I think
I follow that.

MR. VEALE: I have no further
questions, Mr. Commissioner.

THE COMMISSIONER: Mr. Goudge?

MR. GOUDGE: Yes sir, Mr.
Templeton advised me that now that he has at least
one lawyer talking on a scale of 1 to 10, he's made
enough yards for this evening and he has no questions
at this time. It's not been a good night for lawyers,
sir. I think it's appropriate to say to the members
of the community that neither the lawyers nor their
experts will be anywhere in evidence tomorrow evening.
I think it's a very legitimate point that their
presence is perhaps not promotive of the kind of

Thompson, Leonard, Collins
Cross-Exam by Goudge

community hearing that the Commissioner is anxious
to have, and there is no doubt that tomorrow night
of us will be anywhere in evidence.

I just have one or two--

MR. MARSHALL: That sounds
an invitation.

MR. GOUDGE: I just have one
two questions of the panel, if I may.

SS-EXAMINATION BY MR. GOUDGE:

Q Dr. Thompson, did I
at least
understand you to say that at the moment, / your
Society's proposal to the Canadian Government awaits
settlement of land claims in the Yukon, is that

WITNESS THOMPSON: Yes. That
a matter of policy we know that the land claim
is in the way and we accept that. In fact we
recognize that the resolution of that matter has
priority over any further steps to establish the

Q Assuming that the range
go forward, what kind of control mechanism does
Society envisage regulating activity within the
in Canada?

A The matter was considered
at the conference, and there is comment on it. There
is a Committee on Procedures and Structures. It was
suggested as an immediate step, that the department should
designate official responsibility to one of the

Thompson, Leonard, Collins
Cross-Exam by Goudge

1 senior members for the area, and that there should be
2 co-ordination with the administration of the Alaska
3 Wildlife Range in the United States, and that it was
4 assumed that -- and recommendations were made about
5 budgeting and then about the development; at the time
6 it was suggested that Canadian Wildlife Service should
7 be given responsibility for administration of the range
8 because at that time there were possibilities that
9 the Wildlife Service under the new Department of the
10 Environment would be given responsibility for manage-
11 ment of wildlife areas. That has not developed and
12 what would be appropriate in the immediate
13 situation is something we haven't recently addressed
14 our minds to.

16 Q You did say something,
17 I think, in your evidence in chief as to the necessity
18 in the Society's view of the involvement of native
19 people in the management of the land within the
20 range, is that so?

21 A Well, the concept -- and
22 I espouse it modestly because I hate to get myself
23 in the position of suggesting what should be done for
24 native people -- but if they respond to the conceit
25 we have to suggest that it would be compatible to many
26 of them to contribute in a management way to the pre-
27 servation of the range, then that would be an ideal
28 solution; but we're not about to tell the Old Crow
29 people that the best thing for them is to become
30 range managers.

1 Thompson, Leonard, Collins
 Cross-Exam by Goudge

2 Q I take it that is the
3 limit really of the Society's elaboration of its
4 thoughts on the possible involvement of natives in
5 the management of the range.

6 A That is correct.

7 Q Referring lastly to the
8 motion that you read into the record concerning per-
9 mission of certain types of development in the range,
10 I wonder if you could tell us whether, in your view
11 at least, or perhaps the view of the Society, the
12 proposal of the applicant as filed would come within
13 the standards that you see built into that resolution?

14 A This isn't something to
15 which there is any official position in the Society, of
16 course, and I guess do I interpret the question as
17 being , do I believe that the proposal of the applicant
18 could be regulated in the way that would be consistent
19 with the range?

20 Q Yes.

21 A Is that a fair way of
22 stating it? I think it's possible. I'm very skeptical.
23 I think the reason I'm skeptical is that I'm inclined
24 to believe that one step towards industrialization
25 lead to another. The creation of infra-structure makes
26 it that much easier economically and it makes it easier
27 to rationalize the next step, and I'm inclined to
28 believe that a gas pipeline would some day be followed
29 by a hot oil pipeline and that one thing leads to
30 another and it's that kind of fear that makes me
31 skeptical that there could be regulation of this

Thompson, Leonard, Collins
Cross-Exam by Goudge

activity and consequent activity that would be compatible with -- that would make them compatible with the purposes of the range.

Q So the purposes of the range then, can I get you this far, are incompatible with this proposal?

A Well, George, you see, refuses to speculate, beyond the immediate proposal.

Q That's why I didn't ask him.

WITNESS COLLINS: I might just say that the proposal is incompatible with the Wildlife Range, that's there, that's established, that's a reality. The other is the speculative thing.

Q Would you adopt that answer, sir?

WITNESS THOMPSON: Yes, I'm opposed to it, as I've said, before, and I'm skeptical that it could be regulated in a way to be consistent with the purposes of the range. I'm more skeptical now than I was at the time of the conference. At the time of the conference I think that was in 1970, I had a more optimistic view of the possibilities of multiple land use management than I have today.

WITNESS COLLINS: Let me say that if a pipeline decision is made that will require an invasion of the range, then we're all going to have to join in making an accommodation. It's just as simple as that. There are many forces at work

Thompson, Leonard, Collins
Cross-Exam by Goudge

beyond any of us, of course. We have no power of decision. What we do is reason. I think that the range would be capable of surviving a gas pipeline; if we have to accept it, we will. But we won't like it, and it's one of those situations that occurs time and time again in park work and equivalent reserves, and you just have to do the very best you can. We've done some horrible things in United States to our National Parks. Some of them deliberately because it was the only thing to do, with bridges and roads and so on. But we've never liked it, we never liked it at all. The same here. Who would have dreamed 20 years or so or more ago, 25 years ago now when I was fooling around up there, that in actuality we would be facing up today, 25 years later, to this monstrous proposition that we're trying to work out, in some compatible manner? I've been to Umiat and I saw what was done up there, some of those places, and it didn't look to me as if -- as though that would ever be repeated again. It was sort of a dead issue, but of course I was told then not to feel that way. I was told then by competent oil geologists, both governmental and private, that it would happen, and I've lived to see it happen, and again I don't care whether the scale is 1 to 10 or 500 to 1000, whatever it may be, if that's -- if the ultimate requirements of people in North America dictate that this must be done, then it will be done, and we'll have to accommodate it. The only thing is that we've just simply got to force those who do the job to do it -- in the

Thompson, Leonard, Collins
CrossExam by Goudge
Re-Examination

2 first place find out how to do it, in the least
damaging way, and then see to it by private means,
by governmental means, hoping that they will keep
the lead in this direction that they've already assumed,
in my opinion, of doing the finest possible job. That's
about all, it seems to me, that anyone could say.

MR. GOUDGE: Thank you, sir.

I have no more questions, Mr. Commissioner.

THE COMMISSIONER: Well, can
we excuse this panel then, Mr. Anthony?

MR. MARSHALL: Mr. Commissioner,
there's just one point that's arisen from the exchange
that's gone on. I wonder if I might ask a question in
clarification?

EXAMINATION BY MR. MARSHALL:

Q I'll address it to Dr.
Thompson. Just to put it in context, Dr. Thompson,
there really is no proposal being advanced that would
see an oil pipeline go across the range, is there
any that you are aware of?

WITNESS THOMPSON: No, there's
no proposal. / Q
There's talk by one of the witnesses
who spoke earlier about a pipeline perhaps up, an
oil pipeline proposal perhaps being advanced for
transportation up the Mackenzie River Valley, but
there is no proposal that you are aware of, is there,
that would see hot oil being carried across the range?

Thompson, Leonard, Collins
Re-Examination

A No, there is no proposal. What I have in mind is that we've been told that the prospect is the Beaufort Basin, it lies offshore from the range in the Yukon. Whether Canada would allow such oil to be delivered to markets through the Alyeska line, I don't know.

Q Well, to your knowledge of the industry and I know you've been involved in writing in that area for a long time and you're quite familiar with many aspects of it, wouldn't it be logical that oil found offshore in Alaska would proceed via the Alyeska Pipelines ancillary there?

A Excuse me, found offshore of Alaska, yes; found offshore of the Yukon, it's about an equal mileage for a lateral to go to the Mackenzie and there's just as much possibility, I would suggest, of there being a hot oil pipeline lateral across the North Slope of the Yukon as across the North Slope of Alaska.

Q Is there a proposal for something that you base that upon?

MR. ANTHONY: I think he already answered that question, and I don't think the witness is here, with respect to my friend, to give evidence on proposals of a gas pipeline. He's answered the question, I think already once.

A I don't mind answering in this sense, that the oil pipeline proposal is based on, I think, very little in the way of oil

Thompson, Leonard, Collins
Re-Examination

discoveries, great potential. We don't know where the oil will be found there. I'm not talking about an immediate follow-up of a hot oil pipeline, I was expressing a longer range view.

MR. MARSHALL: Thank you, sir.

THE COMMISSIONER: Well, may this panel be excused, Mr. Anthony?

MR. ANTHONY: Fine, thank you, sir.

THE COMMISSIONER: Well, thank you, Dr. Thompson, Dr. Leonard, Mr. Collins. I know we'll see you again, Dr. Thompson, but Dr. Leonard and Mr. Collins, I want to thank you for coming to Whitehorse to give us the benefit of your great experience and knowledge, and I certainly appreciate it.

WITNESS COLLINS: On my part, and I'm sure I speak for my friend and associate, Dick Leonard, it's been a very real privilege to appear before you, Mr. Commissioner. I think this effort of yours is most revealing as to not only the economic difficulties that have to be met, but also in terms of recognition of cultural and aesthetic concerns which I am very, very encouraged to note are given such high priority by industry and by all these good people. Thank you.

THE COMMISSIONER: Thank you.

(WITNESSES ASIDE)

1
2 THE COMMISSIONER: Well, I
3 think we have another witness this evening to hear
4 from?

5 MR. ANTHONY: Mr. Commissioner,
6 Dr. Geist was going to be part of a 3-man panel that
7 was due to Mr. Huss' illness now, a 2-man panel, and
8 is unable to stay beyond early tomorrow. He gave up
9 his holiday this week to appear, and I would be very
10 anxious that he be able to collect the rest of his
11 family, who are still holidaying without him and the
12 timetable required that he leave tomorrow at noon.
13 Given that fact, I would hope that at least his
14 evidence in chief could come in, but I am entirely
15 in your hands, and the wishes of --

16 THE COMMISSIONER: Well,
17 I will be happy to hear Dr. Geist tonight, but if
18 -- it's up to you people. Would you rather, Mr. Goudge,
19 that we do this tomorrow? Or would you rather that we
20 went ahead tonight? I think we can --

21 MR. GOUDGE: Sir, if we can
22 prevail on you to hear it, I would prefer if we could
23 hear his evidence in chief to night.

24 THE COMMISSIONER: All right.

25 MR. GOUDGE: I don't think
26 it will take too long. Mr. Anthony, I think, said
27 half to three-quarters of an hour. We're anxious to
28 hear it and I think he deserves the opportunity to
29 be heard, having given up his vacation.

30 THE COMMISSIONER: Well, of
course he does, and I'm most anxious to hear Dr. Geist.

V. Geist
In Chief

1 I think what we'll do, Dr. Geist, if you don't
2 mind, is you sit down and assemble your papers and
3 there's some more coffee coming in about one or two
4 minutes, and I think we'll just stagger over to the
5 coffee urn, when it comes, and then start again.
6

7 (PROCEEDINGS ADJOURNED AT 11:40 P.M.)

8 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

9 THE COMMISSIONER: All right,
10 Mr. Anthony, carry on.

11 MR. ANTHONY: Mr. Commissioner,
12 we have before you Dr. Val Geist, and originally the
13 idea of the presentation we were to make was to out-
14 line to you the physical and the biological environ-
15 ment of the Yukon Territory that you could consider
16 the alternate routes that have been put before you
17 in some context, and to that end we had asked Dr.
18 Geist to provide an overview of the living environment
19 and something of the significance of living environ-
20 ment of the Yukon, and Dr. Hughs to outline to
21 you the physical environment. Dr. Geist will be
22 speaking to you this evening, and hopefully Dr.
23 Hughs tomorrow or Friday morning.

24
25 VALARIUS GEIST, sworn:

26 DIRECT EXAMINATION BY MR. ANTHONY:

27 Q Dr. Geist, we circulated
28 with your outline of evidence a curriculum vitae
29 prepared outlining your education, experience and
30 publications. Is that curriculum vitae an accurate
statement of your experience and education?

V. Geist
In Chief

A Yes sir, it is.

Q Would you please just briefly then summarize the highlights of the curriculum particularly outlining your education and your experience in the Yukon Territory?

A As to my education, I obtained my Bachelor of Science as well as my doctorate at the University of British Columbia, under the direction of Dr. Ian McTaggart-Cowan, who was my mentor at that stage. I took a doctoral fellowship at the Institute of the Fervahousen under Professor Conrad Lords, and I returned to Canada to take up a position with the University of Calgary when I first was an assistant professor with the Environmental Centre, and then I became the program director for the newly established Faculty of Environmental Design and was in charge of developing curriculum and in fact developing the faculty, that part of the faculty which was to teach environmental sciences.

I abolished that -- I stepped back from that position just a few months ago, and I am associate professor of environmental sciences still, I happen to be right now on a sabbatical leave.

As far as my experiences in the Yukon are concerned, I first came into the Yukon at the tail end of my doctorate study, which had to do with Mountain Sheep, and I spent about three months in early winter of 1965 on Sheep Mountain at Kluane Lake, which happens to be now in the newly formed

V. Geist
In Chief

1
2
3 National Park. Every day, incidentally, or almost
4 every day I used to cross the Haines-Fairbanks
5 Pipeline as I moved up to my animals, to my
6 study animals, of course I crossed it again when I
7 returned. However, the pipeline was only about that
8 high, about six inches high, so maybe that does not
9 quite make me an expert on major pipelines, and their
10 effects.

11 I was asked by the Arctic
12 Institute of North America in order to help them
13 select a route -- not a route, pardon me, a location
14 for a scientific station they were at one time
15 interested in establishing a scientific station in
16 the St. Elias Range, they had hoped at that time
17 to enter into studies of large mammals and I did
18 that for them, I believe that was 1971. This has not
19 been mentioned in my curriculum vitae.

20 My, by far the most important
21 activity, however, which brought me to the Yukon
22 Territory, since 1969, has been my position as co-
23 chairman of a panel of scientists which are or which
24 were working -- this was a volunteer effort -- under
25 the auspices of an International Biological Program
26 on the selection of ecological reserves in the Yukon
27 Territory, not only in the Yukon Territory but in
28 the Western Arctic. It so happens that we divided
29 responsibilities in such a fashion that I was in
30 charge of events going on in the Yukon, whereas
my colleague, who was the co-chairman, was responsible

V. Geist
In Chief

for activities in the Northwest Territories.

For the last eight years, seven years, pardon me, it has been my duty to very frequently be confronted with the question of why certain parts of the Yukon Territory are ecologically significant, and for this reason we had field trips into the Yukon, we had many discussions, we had many unofficial interviews with colleagues working in Yukon Territory because we felt very strongly that the first thing we had to do was to gain an understanding of the ecology of the Yukon, in essence, what makes this country tick ecologically.

This is something that I had to live with, and some of this information is coming through now into the public realm in the form of some reports that we have produced which are listed in my curriculum vitae, and they deal with individual ecological reserves, for instance, and some of these reports elaborate in considerable detail why and how certain animal species, certain plant species, certain plant formations maintain themselves in the Yukon Territory. This incidentally also entailed travelling throughout the Yukon Territory and I have visited a good number of points in that process.

Now, as far as my publications are concerned, I am author at present of two books which are authored alone, and I am the editor of the major symposium in which 54 authors participated and this has been listed.

1 V. Geist
2 In Chief

3 My first book, which was
4 done -- which arose out of my work with Mountain
5 Sheep, netted me the prize of the Wildlife Society,
6 the Book of the Year Award in 1972, and thereafter
7 the Alberta Government decided to give me the award
8 as well.

9 I think, Mr. Attorney, this
10 does in fact cover the significant points in my curri-
11 culum vitae for the present.

12 Q Mr. Commissioner, the
13 full statement of his experience and the books and the areas
14 of experience in the Yukon is filed as an exhibit
15 with this Inquiry.

16 Perhaps we can start then,
17 Dr. Geist, if you would discuss with us the biological
18 significance of the Yukon coastal plain.

19 MR. MARSHALL: If I could
20 just interject, I have got some ten pages of the
21 curriculum vitae which I have reviewed with interest,
22 but I have only 2 1/2 pages of points of an outline,
23 and I must confess that I'm not really sure what this
24 witness is going to talk about. I was wondering if
25 there was anything in a little more detail that might
26 be made available to counsel so they could more
27 easily follow the witness' evidence?

28 MR. ANTHONY: No, there isn't.

29 THE COMMISSIONER: There is your
30 answer, "No."

V. Geist
In Chief

MR. ANTHONY: Counsel can be assured they are working with what I am. I had hoped that the indication of both the curriculum vitae, which indicated the experience and the reports he was principally relying on would--

THE COMMISSIONER: All right, let's get along.

MR. ANTHONY: Thank you.

Q Dr. Geist, start again then with your description of the productivity and biological significance of the Northern Yukon and North Yukon coastal plain.

A Yes, I shall do so. During this Inquiry while I have been sitting here I have heard a very important point mentioned, namely, that the productivity of the northern part of the Yukon Territory is less than that of the Southern Yukon Territory on the basis of a principle which is well known and which is perfectly acceptable, namely that if you go from the pole to the equator, you will find that if conditions are maintained equal, the productivity of the landscape increases, and conversely, if you go from the equator to the pole, that in fact it declines.

The important point is that everything be kept equal, because there is another principle which is equally well known, and that is that if you go from the lower altitudes to the higher altitudes, that productivity also decreases, so that

V. Geist
In Chief

you find your greatest amount of biomass produced at the bottom of the valley or at sea level, and the lowest part at higher elevations.

If you take a look at the Yukon Territory, you will notice that we are rising as we go south from the North Coast, first of all into a relatively high range of mountains in the central part of Yukon Territory, and then in another considerably short distance we are in fact in the highest mountain range on this continent.

THE COMMISSIONER: Excuse me, Dr. Geist. Forgive me. Where did we start? I'm sorry, you said "the gulf," the Gulf of Alaska?

A We're going from the north southwards.

Q Yes, forgive me. Would you mind just starting that journey again so that I --

A O.K., I shall try again. An argument has been made here --

Q Oh yes, I understand the argument about productivity.

A Now I'm making the point that as you go southward from the coastal plain of the Yukon Territory you are gaining altitude all the time, in fact you're not gaining a little bit of altitude, you are gaining a lot of altitude, in fact you're gaining the highest altitude that you can reach in North America, with the exception of one particular mountain, which is Mt. McKinley in Alaska. You're going to the mountain through the St. Elias

V. Geist
In Chief

range which happens to be very high, and the mountains that we cross before we reach the St. Elias Range are no slouchers either, they have mountain peaks which reach 7, 8, 9,000 feet in elevation. They are very high indeed; and for this reason you would expect, for instance, on the basis of altitudinal change productivity of the landscape to decline. There is another very important point attached however, when we are looking at the plants which are grown either at high altitude or at high latitude. That is the following. As we go further north, the fibre content of the plant material decreases; but the significance of that is the following, that as we go further north, the digestibility of the plant matter becomes greater and greater and greater. The most undigestible plants by and large are grown in tropical areas and the plants of the high altitudes and the Arctic area in particular are plants which are highly digestible. They are highly digestible for the following reasons. You happen to have in the north very long days, many hours of sunshine, and you have relatively cool nights. That produces a lot of photosynthesis in plants. You have the development of a lot of carbohydrates, a lot of amino acids, and a lot of proteins and minerals and so on, and the fibre -- and during the cool nights the plants are not able to metabolize away this material that they have gained during the long hours of sunlight in summer, with the result that you have a very thin fibre tissue produced which in fact is very digestible. I just hope, for instance,

V. Geist
In Chief

1
2 that somebody will give you a rather good meal here
3 before you leave of really good Yukon grown vegetables
4 because in the Yukon Territory, for instance, the
5 vegetables tend to be of that nature. They tend to be
6 very sweet, they tend to be thin-fibred, they tend to
7 be very rich, and they tend to be by and large a rather
8 delicate sort of thing, quite different from something
9 grown further to the south, particularly at lower lat-
10 itudes.

11 Now let me point out once
12 more for instance, what the latitudinal effect on
13 productivity can mean. For instance, it is rather
14 well known and accepted that the number of frost-free
15 days that is the time period of uninterrupted warm
16 weather, is rather closely related to plant growth.
17 So we have in the St. Elias Range at Haines Junction,
18 at 1019 where the agricultural station used to be,
19 we have had experiments there and we do know that
20 the frost-free period there is only 15 to 25 days,
21 which is very short, indeed.

22 In Dawson City, on the
23 other hand, which is much further north, but at lower
24 elevation, we have about 105 days, frost-free. But
25 let me try to contrast this with continental Canada.

26 Now we'll go south, we'll
27 go from Dawson City to Edmonton. In Edmonton we have
28 a climate that produces only about 99 days frost-free
29 and let's go further south to Calgary. It produces
30 only about 85 days frost-free. In short, the growing
season in Dawson City is longer than it is in Edmonton

V. Geist
In Chief

1
2 or in Calgary. Now the reason for that is primarily
3 that Calgary, for instance, is twice the elevation of
4 Dawson City. So it is perfectly valid to attempt to
5 go and make predictions on the basis of the principle
6 that productivity increases as we go further south,
7 but there are other factors to consider, and they
8 have to be weighed into the equation.

9 Now there are some other
10 things which are very important when we speak about
11 productivity. We may ask the question, "What generates
12 a high productivity in an area." There are a few
13 principles. I mentioned some. I mentioned the long
14 hours of sunlight. The relatively high surface
15 temperatures of plants is also important, and I would
16 like to mention that this need not be the ambient
17 temperature, this means the temperature which we're
18 feeling right now, the ambient temperature, the sur-
19 face temperature of the plants is very important.
20 They can be heated, despite the fact the air is
21 quite cool, but the plants can be heated directly
22 by sunlight, and heated up by radiated heating.
23 So that they are able to metabolize quite actively,
24 despite the fact it may be reasonably cool outside.
25 So long hours of sunlight is the first thing.
26 Of course we get that north of the Arctic Circle.

27 Another very important thing
28 is the land-water interface, which I believe several
29 witnesses mentioned already and I will draw you some
30 examples of that land-water interface is wherever we
have not just simply the interface, but there must

V. Geist
In Chief

1
2 also be disturbance factor coming in, for instance
3 waves from the sea which continuously disturb an
4 area and they create a situation where certain plants
5 and animals can live, and these plants and animals
6 tend to be short-lived, they tend to produce biomass
7 reasonably rapidly, and for this reason these areas
8 tend to be rather productive. I have no doubt you
9 have flown over Old Crow, maybe you did mention, for
10 instance, flying over the area, that a good many of
11 the lakes tend to be square-ish. That is evidence of
12 wind action. There's wind going back and forth shaping
13 the lakes and creating disturbances on the shore, and
14 this is one reason, of course, why the lake itself
15 can be more productive than say, a pot-hole, which is
16 circular, and which has very little disturbance. Or
17 if we go to the prairies, we have the drought cycles.
18 They are the things that maintain the productivity
19 of the marshland over a 20-year period or so, as we
20 know very well from the studies that have been
21 carried on.

22 THE COMMISSIONER: The drought
23 maintains the productivity of marshlands?

24 A Yes, that's right.
25 Rather odd but this is one conclusion that has been
26 formed. Another important factor in the productivity
27 of an area is the consistency of the substrate and
28 in the northern area --

29 Q Consistency of?

30 A Of the substrate and
I just want to explain what I mean by that. For

V. Geist
In Chief

1
2 instance, you have silt coming down a river system
3 and building up in the estuary of the Mackenzie Delta
4 and of course along the Beaufort Sea as well. You
5 have shallow waters there which means that the land
6 surface below the water can be heated, as long, of
7 course the water doesn't become too deep; and there
8 is a continuous drift of silt that comes into this
9 area fertilizing every year this area and permitting
10 in fact -- because the silt is itself a disturbance
11 factor as well, plus a fertility factor -- it generates
12 a very, very great productivity and I'll come later on
13 back to the same sort of phenomenon in the St. Elias
14 Range.

15 Then there are other factors
16 I mentioned. One of them wind, frost, for instance,
17 all of these if they're disturbance factors, contribute
18 to the productivity.

19 Now if the productivity of
20 that land particularly for wildlife, were not so
21 favourable, then the following thing would be totally
22 illogical, namely, that the northern area is a nursery
23 ground for a great diversity of animal species. But
24 as I mention "nursery ground" I mean more than calving
25 ground for caribou. I mean something quite specific.
26 We know from bio-energetics that the cost of growing
27 and developing animals is much greater than the
28 maintenance cost of these animals later on in winter
29 time. So what we are looking here is at the area where
30 animals congregate because of the super-abundance of
resources necessary for growth and development.

V. Geist
In Chief

1
2 So much -- of such importance is this area that
3 we find here as far as the sea is concerned fishes
4 coming out of the salt water -- out of the fresh water,
5 going to the shallows of the brackish water in order
6 to feed, to pattern, or to grow^{roe}, or for the young fish
7 for that matter to grow up, we find sea mammals, seals
8 and whales coming in bearing their young, producing
9 milk because milk production is quite expensive for
10 the female. We find here, of course, as has been mentioned
11 many birds coming through, the waterfowl, the shore-
12 birds, the song birds, and these happen to be visitors
13 from the tropical zone. They live in the sub-tropics.
14 They live in the tropics but they do come to take
15 advantage of the super-abundance of the northland
16 during the short but intense summer, and the great
17 number of birds which are evident in that area is
18 in itself evidence of the great importance of this
19 area to these creatures.

20 But these creatures happen
21 to be a resource that are not only used by local
22 people, it is a resource that is quite eagerly
23 awaited further south in the continent, it is a
24 resource that almost certainly is being used south
25 of the borders of United States, in Mexico, in
26 Central America. We don't know to what extent it
27 is used, at least I do not, but we do know that such
28 bird species for instance in Europe and in Africa
29 are being used. Song birds are being used, shore
30 birds are being used, not only the waterfowl, and
a rather important point to me is that in essence

V. Geist
In Chief

we find with this bird migration a shift of high-quality protein, excellent food, in other words meat of excellent food value going south into areas that are generally considered to be rather poor in protein for human nutrition, which happens to be the sub-Arctic-sub-tropics, and the tropical areas.

So there is a constituency to be considered that is not represented here, but I do hope that may be the are being considered somewhere in the decision-making process.

THE COMMISSIONER: Now you have been speaking about, I take it, about the interface, so-called, between the land and the water.

A Yes.

Q That is the Arctic Coast of the Yukon.

A Arctic Coast, as well as on the Northern Plain, and the Old Crow region.

Q I see, and you have been seeking to make the point that it's productivity is greater than one might at first imagine.

A Correct.

Q Than by conventional theory might normally acknowledge.

A Yes, I would make that point. I would like to dwell now for a little bit on the caribou in fact I am going to--

V. Geist
In Chief

Q The transportation of protein to southern latitudes would be migratory birds.

A Oh, precisely, free of charge.

Q Well, you're bound to get the better of me from here on in.

MR. ANTHONY: I'm with you, Mr. Commissioner.

Q Perhaps you would go on then and discuss this process you've been outlining to us, with particular concern to the caribou.

A Yes, I would like to go on to that. The ^{first} point I would like to make is that the caribou is just about the only thing we have up there to convert a heck of a lot of rather useless plant material into something that can be used by human beings. We are not trying to protect the environment, let me say the plants for the sake of the plants alone. Surely we are trying to protect the plants for the sake of caribou, for the sake of that part of the ecosystem that we can go and utilize for our material well-being, not only for aesthetic purposes. I feel very strongly about this. I feel very strongly about this as caribou, for instance, utilize such plants which are quite useless to livestock as lichens, for instance; the only other animal that I can think of that uses lichens to any extent happens to be the Siberian snow sheep across the Bering Sea.

V. Geist
In Chief

THE COMMISSIONER: The what?

A Siberian snow sheep.

Q Sheep?

A Rather similar to our

Dall sheep but lives under somewhat different ecological circumstances in very dry country, and very cold country and they tend to utilize the lichens quite heavily. Our sheep do not.

Q When you -- forgive me for another question.

A Yes.

Q But I want to make sure I stay with you. When you travel at all in the Mackenzie Delta or the Northern Yukon and many other parts of the north, you see mile after mile of what is called caribou moss. Is that a lichen?

A Yes, that is a lichen, and it is a composition of several lichen species, mostly of one genera cladena. They are also converters of other useless plants, if I may say useless from the point of view that other wildlife rarely, touches it, for instance the horsetails which tend to grow in marshes, the caribou convert plants which are quite poisonous to livestock, such as the marsh marigold, such as the monksford(?), such as the larkspur, they eat them, they convert a lot of marsh vegetation not touched by domestic animals, and this is rather important that this animal specie be maintained because otherwise much of the land cannot be used by people.

Now what happens in the

V. Geist
In Chief

cycle of the caribou is that the caribou goes to these plains, the coastal plains, in order to calf but not only to calf, and that's the important point. It goes there in order to raise young. It goes there because it is able to produce the necessary amount of milk, which as I said, is rather strainful on the female, and it tends to stay in this area for quite along time, as has been shown by the reports of the applicant, of course, and we do know a few things that tend to take place during that time.

First of all when the caribou returns from the coastal plain, it does so already with a load of fat on its back, it tends to return with a skeleton that had been restored, and it tends to return with a load of vitamins. Now to make it maybe a little more plain, what I'm talking now about is the budget that the animal is starting to accumulate because it is going to go during wintertime into an area and feed on resources that are scarce, they're short in energy, they're short in vitamins, they're short in minerals. That is the winter range.

The caribou happens to be a wildlife species that must use the super-abundance from summer to subsidize its existence and its life in the wintertime. But that's not all. It also is apparently using these resources to grow the fetus that is the female, to use her bones, she uses her own protein material, and uses energy that she has accumulated during summer to already grow the young that will be born in the following year.

V. Geist
In Chief

So that we must look at the coastal plain really as an area that subsidizes caribou on the winter range as well. I think that is the best assessment that we can do at the present time from the overall information that is available to us.

So on the coastal plain caribou are in positive energy balance and nutrient balance and vitamin balance, they're obtaining that, and the winter range when they come down they depend on the vitamins, the minerals and energy to subsidize those which they have obtained directly from the land.

It is for this reason and for the points that I discussed previously that I consider the northern zone, the coastal zone, and Old the Crow Flats and so on, a very, very important area indeed, in the yearly cycle of a great variety of animals species, and an area that is enormously important.

Q You did say "yearly cycles"?

A Yes, yearly cycles, the annual cycles, that's right, and this is a point that I believe very, very much attention must be paid to.

MR. ANTHOBY: Q Dr. Geist, I wonder if we could then perhaps follow the caribou to the southern region, if you could discuss some aspects of the biological significance of the southern and central parts of the Yukon also?

V. Geist
In Chief

A Yes, I shall do so.

Let me put it this way.

Now the southern Yukon, you consider to be the backup system to the productive areas of the estuaries and the lowlands. I think that capsules it.

What happens to take place is that we have first of all land rising in elevation, we have on this land glaciers and snow fields, and we have very intense frost activity on that land--all of which produces the very rich fertile silts that are spewed out from underneath the glaciers which go down the river systems and fertilize whatever they make contact, and go out into the estuaries, out to sea, be it out in the Bering Strait or in the Yukon Territory which produce the silt load that go out into the Mackenzie River. We have the glaciers as great disturbing forces, which at the same time grind down the mountain, and produce the fertility that is necessary. We have the elevation, which tends to catch the rainfalls, and also provides the kinetic energy for water to gain speed as it runs down these river systems, and in the process of doing so, begins a work along the river system which ultimately makes them the oasis of life, in this land. It is the flood plains of the rivers which are the most productive zones, primarily because they are the most highly disturbed in the most highly fertilized zones, and they tend to have generally the uplands covered more frequently by what we call as ecologists, climax vegetation.

V. Geist
In Chief

That means vegetation which tends, is sort of a cumulative vegetation, the last vegetation to come which is by and large not terribly productive unless there are several factors enter into it. For instance a forest fire sweep through the stands and in no time flat we have a reasonably productive site again, and another thing that we have to consider in the mountain regions are micro-climates generated by the land form, so that we have pockets of high productivity and rather exceptional ecological areas.

As we go into the mountains, yes we do tend to go into greater diversity of eco-systems which are primarily produced because of the altitude that we have the micro-climatic effect, and to some extent of course also the latitudinal gradients.

I made mention just a few things which may be of interest such as for instance inversion layers which we find in the mountain regions which are quite important apparently. This research is as yet not in the public realm, although it is something that my graduate students and I have been working on.

THE COMMISSIONER: Your what students?

A My graduate students and I have been working on. It indicates, for instance, that in order to successfully conserve energy and nutrients it is very advantageous for most animals to go to relatively high elevations in wintertime, which to

V. Geist
In Chief

some extent explains why the caribou herd -- the Porcupine herd, for instance, goes up into the tributaries of the Porcupine system and goes up into the mountain region. In so doing they may go into inversion layers which differ from the valley temperatures by 20-30 degrees Fahrenheit, and we can calculate that to Centigrade if you want to, it will take just a little bit of time but I think we still know each other's meaning when we mean Fahrenheit. My God, I changed over from Centigrades when I came to Canada and now I have to make another change.

Q Well, I think you and I must stay on Fahrenheit.

A We'll stay on Fahrenheit, good, it's a fair agreement.

We find for instance in these areas and also the southern exposures tend to permit animals to stay in ambient temperatures that reduce energy expenditures, and this is something that has to be looked into when one considers human activities on caribou range. They also prefer the southern slopes, for instance, again for a very good reason, in bioenergetics they tend to save a considerable amount of energy from getting direct sunlight on them. Even weak sunlight in wintertime, for every megacalorie of sunlight that hits their hide, we can postulate approximately one-third of a megacalorie being saved from oxidation. This is research work done by animal scientists,

V. Geist
In Chief

trying to figure out what is the effect of sunlight for instance. But, it's these little factors that as a student of large mammal biology we've become aware of, and these are the sort of things that we tend to look for and try to bring into the decision-making process when we have anything to say at all about the effect of any system on the animals of a given area.

Now these river systems I was talking about also represent a latent agricultural potential of the Yukon Territory, a potential that can awake because the Yukon Territory, surprisingly enough, does produce a reasonably decent crop. For instance, we had the Research Station at 1090, 19 at Haines Junction, and despite 25 days of frost-free but growing grain and crops, root crops and other vegetables on exceptionally good soil, namely the loess soils generated by glaciers, they tend to have a productivity that was on par with that of Southern Alberta, about 65 bushels of barley to the acre; 90 bushels of oats to the acre. In short there is quite a bit of an agricultural potential that is still dormant in fact in the river valleys, and which could possibly erupt should any pipeline cross this land, and should any demand be made on the soil. This is another point that may be worth considering.

Q I'm sorry, I'm -- I didn't follow that. You say that the river valleys of the Yukon have a potential for --

A Agriculture.

V. Geist
In Chief

Q -- agricultural
productivity comparable to Southern Alberta?

A Maybe even more, at
lower elevations, yes.

Q Now I didn't follow
what you said the impact of a pipeline, if one were
built, would be.

A The impact of a pipeline
could be that because the population of the Yukon would
rise, it would become, the economy of scale would
permit agricultural development here. It may become
economically feasible, in fact, to have meat inspectors,
for instance, it may become economically feasible to
have farms in the area, and this is one of the impacts
that is likely to occur if the population of the
Yukon is to increase because of pipeline activities.

I think this is just some-
thing that has to be brought out, it is a distinct
possibility.

I shall mention briefly
southern
a little bit about the St. Elias Range because I
would like to return to it for only one moment, when
I'm talking about ecological reserves.

Q Just excuse me. The
southern St. Elias Range is marked in white on that
map nearest you?

A Yes, it is, by and large.
You're looking at the area, if you go just about an
inch or so on that map outside the white zone, you

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are covering pretty well the St. Elias Range.

The St. Elias Range is a very unique area, not just simply in the Yukon Territory but in the world. Whatever pipeline activity will take place, I hope will take that into account, and I shall elaborate a little bit.

The St. Elias Range is an old epicentre of glaciation, which means that this is the area from which glaciers pulsated out, and moved out into the lowland. In fact, they moved out a considerable distance to the lowland. We can observe today in the vicinity of these very large glaciers some of the phenomena that were at one time prevalent over vast areas of the continent. During the inter-glacial phase, and we happen to be right now in inter-glacial, the so-called peri-glacial that is ecosystem, that is ecosystems around the edge of glaciers, shrink and become quite insignificant, whereas the tundra, for instance, spreads out very widely during the glacial phase. Of course the opposite takes place and we can see the St. Elias Range for instance, how the very vast loess fields that are the breadbasket of United States and of Southern Canada --

Q Excuse me, excuse me, forgive me, I'm not altogether with you.

A O.K.

Q Could we --

A Can I back up?

Q -- back up to the

V. Geist
In Chief

distinction between the glacial and inter-glacial
phases?

A All right.

Q The impact on the tundra
and so forth.

A The point I'm trying to
make is that we have in the St. Elias Range a very
unique area which has a great cultural value. I'll
come back to the cultural in a moment. I made the
point that it is of cultural significance because you
can observe today in the St. Elias Range phenomena
which we have every reason to believe took place on
a vastly greater scale during the epoch when great
glaciers covered this continent, as well as Europe.
Why this is significant is twofold. First, you can
observe, for instance, how the loess steps are being
formed.

Q What?

A Loess steps. When a
glacier sits on a mountain range, it grinds away
at the rocks, and spews out this result of grinding
the silt. Now that silt goes down to the rivers
and tends to fill up river valleys. Then as the water
goes down in summer, these silts bank of exposed,
the action of sun and wind. Of course there is desiccation
and in no time flat you have winds which come
down from glaciers blowing along these valleys and
whirling the fine, very fertile loess in great clouds --

Q What's that word, "loess?"

A "Loess", it's a German

V. Geist
In Chief

word, L-O-E-S-S, pardon me, please, for using it.

It's a conventional term, it simply means wind-blown silt, that's what it means. And when we speak of loess deposits, we speak about deposits of wind-blown silt that usually has had glacial origin. Now you can see today in the St. Elias Range if you are coming up at the proper time of year, these very same phenomena taking place, you can and I have, stand right in these storms, loess storms, and some of these clouds reach 3,000 feet elevation, they're just howling down the valleys and out into the land, and you can see for yourself how some of the loess deposits are made. You can appreciate maybe that we are still living off the legacy of glaciers in the prairie regions today, or in the United States, the breadbaskets of the world tend to be the loess deposits, be it in Europe, Germany and so on, be it on the Yellow River in China -- not the Yellow River but the large plains of China. These are very, very fertile rich deposits, and which in themselves set back ecosystems to more productive states, and you can observe that today right there.

The other point of significance was something coming out quite recently, is that when we examine our own pre-history, it is in fact in the face of very large glaciers that we have spent a very large -- not a very large but the terminal part of our evolutionary history.

Q A what part?

A The terminal part of

V. Geist
In Chief

our evolutionary history and so when you're looking at some of these loess fields, you're looking at the old part of home. That's the reason for the cultural significance of that land.

You have a great, actually peri-glacial phenomenon, some of which are so counter-intuitive that when we --

Q Counter --

A Counter-intuitive, they are so far out, in essence, that we were as ecologists, large-mammal biologists almost stunned in noticing that for instance we have in the Klutlan glacier, which is the largest glacial terminus, actually, in the St. Elias Range in the Yukon Territory we have a winter range of moose and forests right on top of a glacier, and there is nothing in the world like it.

I would like to return later when I'm speaking about ecological reserves for one brief moment only once more to the St. Elias Range,

I wanted to bring out in this general sketch some of the things that we learned as ecologists, just a few of the highlights of the ecology of the Yukon Territory, and the point that I was trying to make a little previously is that please consider the Yukon in essence a hinterland for as many of the activities that take place on the estuaries and at lower elevations around the edges of the continent itself.

MR. ANTHONY: Q Dr. Geist,
I wonder if you would mind just returning to the

V. Geist
In Chief

2 caribou and discussing some of these processes and
significance of these various areas in the context
of the caribou?

A Yes. Let me
out I am very concerned about the caribou. I am
very concerned about the caribou as a professional
who has studied animal behaviour. That is what I
won my spurs, if I ever won any spurs in, it is in
animal behaviour, and I am very much concerned about
it because we are dealing here with a species which
have a very peculiar social system. It has a
social system that appears to act as a transmitter
of a tradition of where to go at what time.

Now the history of large
mammals is quite clear. Those animals which have
been highly social, like the caribou or the mountain
sheep, which I studied, have had a rather dismal
history in interaction with man. Rather dismal.
I published these findings years ago, as a matter
of fact, and I have found that others who have looked
at this same problem come to the same conclusion.
There are some animals which literally take advan-
tage of man's activity, and who thrive, and which
we need not worry about. I for instance don't worry
about the moose at all. This is one species which is
very hardy, it will bounce back. You shoot them out
of one area, as long as you have decent populations
they will be back. No problem. Never worry about them.
They can take care of themselves splendidly.

V. Geist
In Chief

The history with caribou and with mountain sheep is an entirely different one. There has been enough written, there is enough in the public domain at the present time for me not to go into any detail except to say that conservation measures which seem a priority as being good, like granting protection to an animal, has not succeeded in bringing these animals back to original population sizes. I must also point out that not all my colleagues which call themselves mammalogists necessarily share my concerns; but I also must point out that others who have expertise in animal behaviour, do.

So there is some division in this camp, and when I'm talking about animal behaviour I must also say that you're talking about the branch of the discipline of biology which is very recent. There are not very many people which have intensely occupied themselves with this problem. It is because I have that I claim that I am very, very concerned indeed.

Now let me show you one thing that we stumbled on when we went into the Yukon Territory. We were, of course, quite early aware that there was a herd of caribou in the northern parts of the Yukon Territory, the Porcupine herd. But I did have to speak with a good number of our oldtimers who have travelled the Yukon here in previous years and what they told me was in fact that migratory caribou used to be exceedingly abundant in the southern parts of the Yukon Territory. The herd that we were talking about was identified as the

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In Chief

the so-called 40-mile herd. It apparently moved up the drainage system of the Yukon, it moved up the branches, in the fall, intending to spend the winter in the southern Yukon, and it went into the Dawson Range, it went in across what is now the Alaska Highway into the St. Elias Range, it went up the Pelly River, it went up the McMillan River, it went as far as -- it went past Whitehorse here, along Lake Laberge, it went as far south apparently at times as Northern British Columbia.

The persons that I had talked to, some of which were retired R.C.M.P. officers, others which had been scientists that worked in this area, river boatmen that used to pilot the steamers down the Yukon, were pretty well unanimous in one thing. They tended to be almost astonished at the sizes of these migrations. This was nothing small. I happen to have a picture taken in 1927 by Mr. Allan Taylor from the river boat of caribou crossing the Yukon, and this is a rather dense mass of animals, forest of antlers as they crossed.

THE COMMISSIONER: Where were they crossing the river?

A Well --

Q Approximately.

A -- they certainly did cross in the vicinity of Dawson.

V. Geist
In Chief

Q But that photograph
would be in that vicinity?

A I don't know where
in fact that was taken. He simply told me he'd take
a look, and "Keep it," he said. "This shows a herd of
these caribou crossing which I took in 1927." He
also told me they had to stop river boats in order to
permit the caribou migration to carry on. He said
it would take about ten days for the caribou to
cross at Dawson, the point being that there appears
to have been very many caribou, but nobody knows
the exact number, of course; and these are animals
that were utilizing large areas of what today are
areas empty of migratory caribou, that were making
use of the plants that were there as converters
at that time.

In the 1930's this
caribou herd began to falter in the sense that
it became less predictable. People had difficulty
shooting the number of caribou that they
wanted, and in the 1940's it migrated apparently
for the last time. I have not done a detailed
study or investigation because my time simply did
not permit that, to do it, but I have heard and
I believe that this evidence can be dug up by
anybody who has the time and money to go and do
the study. But essentially a remnant herd of
about 25,000 caribou remained on the Alaska side
and this was the remnant of the 40-mile herd, and

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1 that it vanished. Whether it vanished or just
2 what happened to it, nobody seems to know.

3
4 Q It vanished?

5 A Vanished, yes, vanished.
6 We don't know what happened to it, it disappeared.

7 The important point is not
8 maybe that caribou were decimated in the Southern
9 Yukon by all the various activities that took place,
10 many of these caribou were shot for dog food, because
11 no self-respecting Yukoner on those days would eat a
12 caribou if he could get moose. The important point is
13 that it is now better than 30 years ago that these
14 caribou migrated. They have not come back.

15 Yes, as ^{an} animal behaviourist
16 I can say in theory it is possible to reconstitute
17 a migratory animal herd, a migratory caribou herd, in
18 theory. It might even be done in practice with very
19 small caribou population by an acquaintance of mine,
20 a good friend of mine, Dr. Bergroud, and he did this
21 in Newfoundland.

22 Q In Newfoundland?

23 A In Newfoundland, that's
24 right, small herds were again reintroduced in areas
25 that caribou had previously utilized, and that they
26 are now extinct in; but to reconstitute a migration
27 on the scale that this 40-mile herd apparently moved,
28 would be a feat that is incredible for the very simple
29 reason that you literally would have to lead individual
30 young caribou all the way. A human being would have
31 to do it. Eventually these young caribou would have

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1
2 lead others around about, because it is a transfer
3 of knowledge that takes place between the older
4 generation of caribou and the younger generation
5 that is important in the maintenance of migratory
6 activities and that certainly has been demonstrated
7 even in accidental experiments such as in trucking
8 experiments of caribou in Norway and there is ample
9 -- not ample literature, but there is information
10 available, and this information is also in the
11 public domain.

12 MR. ANTHONY: Q Dr. Geist,
13 I wonder if you are able to --

14 THE COMMISSIONER: Well, just
15 before you go on, the 40-mile herd you say migrated
16 for the last time, I take it south along the valley
17 of the Yukon in whatever year it was --

18 A My understanding was
19 Q -- and never returned,
20 is that it?

21 A And was never seen
22 again, Mr. Commissioner. In other words it came
23 somewhere north of Lake Laberge in the 1940's
24 and that was the last time it made that trip.

25 Q Well, presumably it
26 migrates south along the river.

27 A Yes.

28 Q Was it seen in Alaska
29 or down-river?

30 A After 1940, as I said
for some time a remnant herd appeared to exist in

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In Chief

Alaska.

Q Oh, I see.

A This is what I heard in discussion with colleagues, and I'm basing what my statements are on information I obtained five or six years ago, and took down in my notes. Again I feel this is something that can be investigated by those that can find the time because this is a lengthy investigation, you have to go back to the historical records and all sorts of things. It takes time, to make the point, and the only point I was interested in was in fact there were enough old-timers whose stories matched beautifully, that there once used to be caribou, migratory caribou, but they're gone. Of course there are mountain caribou in existence in the Yukon, but these are quite different animals. Their biology is somewhat different, and I have on the basis of my experience with these animals, and I lived with Osborne caribou for several years, for two years in the Spatsizi region where I studied the south of the Yukon border in Northern British Columbia when I studied Stone sheep, Osborne caribou were quite prevalent, I observed the animals there and on a subsequent trips as well as on the analyses of literature I did write what I believe to be is the first analyses of the ecology and I'll be perfectly happy to bring this forth to the Inquiry should this be necessary. It is in one of our reports on the caribou in the International Biological Program.

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As I said the Osborne caribou or the mountain caribou are somewhat different animals ecologically and their ranges tend to be much shorter and much smaller, although the principle still applies, they utilize resources by being at the proper time at the proper place, and if you disrupt these migrations to any extent you tend to lose part of the range. Now this is not simply hypothesis, this has been demonstrated very adequately in studies in New Zealand on red deer, where in fact disruption of normal migratory patterns was the aim of the game managers because they tried to knock out these red deer populations so they would not do such damage to forests, for instance. This has been done by Les Bachelor, for instance, in New Zealand, with splendid success. It takes relatively -- well, it takes some rather intense hunting in those areas where you do not want to have the animals in order to alienate them, on a rather permanent basis because five years after these experiments were carried out, the red deer lived nearby in second-rate habitat but they had not returned to the forestry plantations in the meantime.

The other bit of information I got on caribou was there was apparently a caribou herd south of Haines Junction which went out about the time when the Alaska Highway was built. I was told by those that have actually hunted there, I think it was two persons, that said, "Yes, there used to be caribou there, we used to go there in the 1940's to shoot caribou, but of course they are not

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1
2 there any more," which is correct, they are not there
3 any more. There are a few caribou in the St. Elias
4 Range, as well as on the other side of the St. Elias
5 in the Nisling Range and there are caribou at the White
6 River but I don't know just exactly what creatures
7 they are. You require a good number of specimens to
8 be shot in order to do positive identification and
9 maybe this isn't even worth the bother shooting those
10 few animals that are there.

11 MR. ANTHONY: Q Dr. Geist, I
12 wonder if you could on the basis of this ecological
13 overview, and in particular your comments on caribou,
14 if you could take a moment to describe the -- your
15 views with respect to the construction of pipelines
16 and in particular consideration of alternate routes
17 through the Yukon?

18 A Yes. Well, we have heard
19 mention, the incremental effects of systems, transpor-
20 tation systems added one on top of the other. I could
21 only agree with the principle. I think it's a valid
22 principle. It's a principle that ought to be inves-
23 tigated, and it's a principle that deserves consider-
24 ation. I can also conceive, for instance, that if we
25 would add a road through the -- along the prime route
26 and a railway and a hot oil pipeline. It would have
27 very likely rather detrimental effects on the caribou.
28 I have no difficulty in conceiving that, whatsoever.

29 I do have difficulty conceiving
30 that there is going to be a synergistic effect on
wildlife or on many species of wildlife if in fact

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1
2 the gas pipeline were to follow the Fairbanks
3 corridor rather than any of the other corridors.
4 I don't know exactly what major wildlife species
5 in the Fairbanks corridor, which I have travelled,
6 certainly on the Canadian side, there would be.
7 The migratory caribou are extinct, they're gone, they are
8 not any more a source of worry. They're finished.

9 What about mountain sheep?

10 If the pipeline is going to go as the applicant
11 indicates, yes, there is going to be a contact
12 between mountain sheep, for instance in the St.
13 Elias Range at Sheep Mountain, which is a very
14 critical area, I feel, and some rather sophisticated
15 thought would have to be applied as to where the
16 pipeline would go, but I'm not particularly worried
17 about mountain sheep. I do know something else which
18 was brought out by one gentleman, namely, that
19 these animals can be habituated to the activities
20 of man, and those sheep are in fact already habituated
21 to the activities of man because they have been
22 protected for a good long time from poaching, and
23 if you do not hunt mountain sheep, I will stake my
24 professional credibility on one statement, that I
25 will go into an area with unhunted mountain sheep
26 and within six months the population of virtually
27 every animal will eat out of my hand. They are that
28 easy to tame. I've done it.
29
30

1 V. Geist
2 In Chief

3 So they can take almost
4 incredible disturbances, but I believe that at a
5 later stage in the Inquiry some of these points
6 will be raised so I don't want to dwell too terribly
7 long on this. The point is that mountain sheep,
8 certainly at Sheep Mountain, I am not terribly
9 worried about, or for that matter any other part of
10 the St. Elias Range where the Fairbanks corridor
11 comes close to.

12 As we go away from the St.
13 Elias Range, then we already enter a country that has
14 been heavily hunted, and the effect on mountain sheep
15 has already taken place. No study that I know of has
16 been done in detail on this. I have only to go on
17 the statements by people that make a living guiding
18 mountain sheep, and they are by and large less than
19 happy about the effects of the Alaska Highway on
20 the territories that they happen to guide in. As I
21 said, I am not aware of any scientific study that
22 has been done on the effect of the Alaska Highway,
23 let us say, on mountain sheep, but by and large
24 from what I have heard, and it's hearsay evidence,
25 but it makes sense to me because of the theoretical
26 considerations that I bring to the picture, that
27 mountain sheep have already been rather severely
28 disturbed.

29 Wherever a possible gas
30 line, if it were to follow the Fairbanks corridor,
would possibly go. If other transportation systems
were to be added, I don't know how they could

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possibly surpass the effect of the highway, which has bred a lot of side roads in a variety of areas. In other words, the highway has in fact done its effect of disturbance, and I've told you earlier along I wasn't very worried about the moose. They will be going back and forth and crossing the highway, but to take a completely ridiculous case, if you would have a highway, to the left a high bermed gas pipeline to the right a high bermed oil pipeline, I am not terribly afraid at all about the wildlife because no hunter could see anything past these berms.

Well, we can take hypothetical examples and these have been taken, I believe, a number of times in the hearing.

I may also address myself shortly to the question that has been asked of witnesses. Let us assume for instance that the applicant is able to carry out his own wishes in terms of protecting the environment in the north. Meaning by this that no hunting would be permitted by personnel, no road would be constructed along the prime route, I'm bothered only by the narrowness of the considerations. There is going to be barge traffic in the coastal areas, some of the very highly productive lands, presumably when there is no ice on the sea. I am perfectly aware that there would be a considerable amount of trucking up to Dawson and up the Dempster Highway. More facilities would be built along these highways to accommodate trucking. There would be an increase

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In Chief

1
2 in the population of Dawson City, almost certainly.
3 There would be good Yukoners which would expect
4 to drive along their roads and shoot their caribou or
5 their moose, whatever they see, and I'm not stating
6 this in any derogatory sense. I happen to be a hunter
7 myself and I do appreciate the fact that a moose that
8 has to be carried only 100 yards is considerably less
9 of a bother than one that has to be carried a mile.

10 I am also uncertain that no
11 secondary roads would be built off from the Dempster.
12 In short there are almost certainly going to be second-
13 ary effects which the applicant has very little control
14 over. My point being that we have in the Northern
15 Yukon, and particularly in the Porcupine herd, a
16 very great treasure, a very great biological treasure
17 which has a potential of being used for millenia
18 after the last drop of oil and the last bit of
19 gas has left the Northern Slope and that indeed we
20 have reason to be afraid that if construction activities
21 go on in the north, that ultimately secondary effects
22 may take place and that this resource will be rather
23 badly damaged. I don't know if it will
24 return again to its original size, that's what
25 bothers me.

26 If the applicant could
27 demonstrate to me that he could re-construct caribou
28 herds, then I would feel very much more at ease. If
29 I could see that the applicant could demonstrate
30 conclusively that whatever effects take place they
could be remedied, I would have little worry.

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In Chief

Now just a little mention
about ecological reserves.

THE COMMISSIONER: Excuse me,
Dr. Geist.

A Yes.

Q I was thinking we might
adjourn now until tomorrow. Having regard to Dr.
Geist's travel arrangements, when do you suggest we
should reconvene, Mr. Anthony?

A Could we take three
minutes? I'm finished then.

Q All right, forgive me, yes.

A That's all I have.

Q I don't want to rush
you.

A No, not at all. As I
said, three minutes should finish this.

I just would like to make
a very small point indeed, and that is in the planning
of alternative routes that ecological reserves be
given the same due consideration that ecological
reserves are given in the decision-making in the
primary route. I think the applicant was exemplary
in that instance; in the Southern Yukon we have
identified a number of areas, some of which are of
great significance, and I've indicated some in
the St. Elias Range which I am most enthusiastic
about, as indicated, but there are other areas as
well, and whatever routes are considered I just
hope that these are going to be looked at and

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2 In Chief

3 considered in the decision-making process. My
4 conclusion just preceded my statement about ecological
5 reserve, and that was all that I would have to say;
6 thank you for listening so kindly.

7 MR. ANTHONY: Mr. Commissioner,
8 I might add that the map indicating the ecological
9 reserves will be filed as an exhibit with this Inquiry.

10 THE COMMISSIONER: Yes, that
11 is this map here?

12 MR. ANTHONY: Yes, the one
13 that's on the screen.

14 THE COMMISSIONER: Yes, and I
15 would like the map showing -- introduced by the Dr.
16 Thompson panel, the one that Mr. Collins did in his
17 room last night, I'd like that one marked; and that
18 big one that I think Arctic Gas produced, I'd like
19 marked, and the map produced by the Council of Yukon
20 Indians I'd like marked.

21 (SYNOPSIS OF DR. COLLINS' REMARKS MARKED
22 EXHIBIT 169)

23 (BOOKLET "ARCTIC GAS PROJECT" MARKED EXHIBIT 170)

24 (MAP INTRODUCED BY THOMPSON PANEL MARKED EXHIBIT 171)

25 (MAP BY ARCTIC GAS MARKED EXHIBIT 172)

26 (MAP BY COUNCIL OF YUKON INDIANS MARKED EXHIBIT 173)

27 (MAP SHOWING ALTERNATE ROUTES MARKED EXHIBIT 174)

28 THE COMMISSIONER: Now, Dr.
29 Geist remains to be cross-examined, but he has to get
30 a plane tomorrow, so -- and having regard to the
witnesses still to be heard after that, so that we
can devote tomorrow evening to a community hearing,

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2 In Chief

3 and then carry on Friday, when should we reconvene
4 in the morning?

5 MR. GOUDGE: Could I suggest
6 9:30, sir? I know it's been a long day and it will
7 be a long day tomorrow, but I think if it's 9:30
8 the cross-examination may be very short, I think
9 counsel can keep in mind that Dr. Geist is very
10 likely to be back with us in Phase 3.

11 MR. HOLLINGWORTH: Mr.
12 Commissioner, might I suggest that we could possibly
13 take a quick consensus of counsel now as to whether
14 there will be cross-examination and possibly an esti-
15 mate as to how much, if that's of any assistance.

16 MR. GOUDGE: If we could
17 start at 10 o'clock, sir, I think we may -- MR. HOLLINGWORTH
18 I personally
19 don't expect to do any cross-examination of Dr. Geist

20 THE COMMISSIONER: Well, Mr.
21 Marshall? You have your advisors on either side, so
22 it looks bad.

23 MR. MARSHALL: I made a lot
24 of notes, I'll have to talk to the advisors.

25 THE COMMISSIONER: Well,
26 9:45, and bear in mind, Mr. Marshall, that Dr. Geist
27 is returning. You may yourself wish to cross-examine
28 him at that time.

29 MR. MARSHALL: I may.

30 THE COMMISSIONER: And Dr.
31 Geist, I apologize for the fact that we made you
32 wait all day and all night, and I may say I was fas-
33 cinated by what you had to say, and I followed it as

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In Chief

1
2 closely as I do the evidence of any other witness
3 despite the hour, but I apologize to you for that.
4 We shouldn't be hearing people this late at night.

5 Well, all right, 9:45.

6 (PROCEEDINGS ADJOURNED TO AUGUST 14, 1975)
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MACKENZIE VALLEY PIPELINE INQUIRY

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IN THE MATTER OF AN APPLICATION BY CANADIAN ARCTIC
GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT
BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON
TERRITORY AND THE NORTHWEST TERRITORIES FOR THE
PURPOSE OF THE PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Whitehorse, Y.T.,

August 14, 1975

PROCEEDINGS AT INQUIRY

Volume 54

CANADIAN ARCTIC
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APPEARANCES:

Ian Scott, Esq., Q.C.,
S.T. Goudge. Esq., & appear for Commission;

J.J. Marshall, Esq., appears for Canadian Arctic Gas
Pipeline Limited;

R.G. Gibbs, Esq., and
Mr. Hollingworth appear for Foothills Pipelines;

R. Veale, Esq., appears for Council of Yukon
Indians;

R. Anthony, Esq., appears for Canadian Arctic
Resources Committee;

G.W. Bell , Esq., appears for Indian & Metis
organizations of the Northwest
Territories;

J.U.Bayly, Esq., appears for Inuit Tapirisat of
the Mackenzie Delta.

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Whitehorse, Y.T.,

August 14, 1975

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

DR. VALERIUS GEIST, resumed.

THE COMMISSIONER: Well, we'll call the hearing to order this morning, ladies and gentlemen, and I believe yesterday we had completed the examination in chief of Dr. Geist so I take it we are now ready for cross-examination?

MR. MARSHALL: Thank you very much, sir.

MR. ANTHONY: Mr. Commissioner, I wonder if I might just take a moment of time to both assist my friends and the Commission. Due to a problem of Logistics and so on we have two witnesses that have come in from Alaska who are only available today.

I have this morning received copies of their statement and I am going to make it available to the Commission and hope that it can be photocopied and available for the members to assist them at least to follow along with the evidence.

These witnesses unfortunately are not available to return, at least to the best of my information at a later date. Dr. Geist will be returning to give evidence at later phases in the Inquiry and has indicated his willingness to return for cross-examination even on this phase at a time convenient to my friends, so I really mention the fact that in the one case we

may have some problem with re-attendance, but I can at least tell my friends that Dr. Geist will be returning at a later stage in the Inquiry.

MR. MARSHALL: Sir, if I may, I have a couple of comments on that.

This is an Inquiry and it is now in effect an Inquiry with two proposals before the Commission, and it seems to me that it is important to my client that we be enabled to cross-examine witnesses called by any of the participants or Foothills when they give their evidence, so that we have an opportunity to test the evidence immediately rather than leave it on the record for some series of weeks or months and so on and then attempt to come back to it at a much later date.

So I think in principle, the parties ought to be entitled to cross-examine witnesses immediately. Accordingly I would like to proceed to ask Dr. Geist a few questions.

Now, my learned friend suggests that there is mention of the witnesses from the State of Alaska won't be available to come back. He said as well that he just has now copies of the evidence that they are going to be delivering. I had received from Mr. Anthony and had discussed with him some sketchy outlines of the evidence that these witnesses were expected to cover. They in no way told me what to expect from their evidence. I find it extremely difficult, even having advisors here to be able to listen to, in some cases very

1 complex, technical evidence and immediately proceed
2 with the cross-examination. In view of the fact that
3 the procedures that are to be followed by the
4 various participants were set out in your rulings
5 and there is requirement of a synopsis of the
6 evidence to be circulated two weeks in advance and
7 so on, I think that Mr. Anthony is really asking for
8 too much indulgence on the part of other counsel
9 and I am afraid that my client's interest would be
10 prejudiced if we were to go along with his suggestion
11 that we proceed with these other witnesses immediately,
12 not having any idea now, what they are going to
13 say, and not have an opportunity to cross-examine
14 them again at a later date.

15 MR. ANTHONY: Mr. Commissioner,
16 if I may respond to that at least quickly.

17 First of all, the synopsis
18 of evidence that went out was sent with the full
19 intention that the synopsis indicates the nature and
20 type of evidence that was to be provided, and on the
21 basis of the reports that were listed there, and on
22 the basis of the outline of evidence, I would expect
23 that that would adequately indicate the nature of
24 the evidence to be presented and that certainly was
25 the intention of the synopsis and it certainly was
26 the entirety of the evidence available to us.

27 If my friend feels prejudiced,
28 that he is unable to adequately prepare his cross-
29 examination on the basis of the evidence, I think
30 first of all, he should perhaps listen to the evidence

1 and may feel that the information provided adequately
2 in fact, prepared them, but certainly we will do
3 everything we can to have the people return for pur-
4 poses of proper cross-examination, and it has been
5 our intention from the outset to co-operate with
6 this Inquiry and with the participants and if my
7 friend really does feel prejudiced by the nature
8 of the synopsis, then I am prepared to go and do
9 what I can to assist him at that stage.

10 There are two fundamental
11 differences between the evidence being called by
12 people such as ourselves and the Applicants and
13 the first one is that we are largely to be responsive
14 to the sort of evidence that is being presented and
15 we attempt in the synopsis to outline the issues
16 that we will be addressing, to outline the subjects
17 we will be providing, and to indicate sufficient
18 information on the sort of research and reports that
19 the witnesses will be relying on, and then we hope to
20 assist the Inquiry by allowing witnesses to comment
21 on what has gone on before and put their evidence
22 in the context of what has taken place.

23 Secondly, and this deals
24 perhaps more particularly with the Canadian Arctic
25 Resources Committee, we have accepted as one of
26 our functions and roles in this Inquiry, not merely
27 to present a case in a perspective which we have
28 categorized, assessed, approved and vetted with
29 everybody that's required, but in fact to facilitate
30 the attendance of other people who feel this Inquiry

1 is very important and who are anxious to have an
2 input. These people largely are on a voluntary
3 basis and we are therefore somewhat constricted
4 in our ability to make demands on them in the way
5 that perhaps we could in other circumstances.

6 I think also that we are attempting to allow these
7 people, and I view particularly the Range Society and
8 the witnesses we call today to come before this
9 Inquiry and present their -- a statement of their
10 evidence of what they want to say to you and in
11 doing that we don't have necessarily the control
12 of structuring their evidence in a form.

13 We try merely to indicate the evidence that they will
14 be giving so that my friend can have whatever ad-
15 visors and consultants he feels are important to
16 be with him.

17 I respectfully suggest that
18 that complies with your rulings and re-emphasize
19 that certainly that if my friend feels seriously
20 prejudiced, that I will do everything we can to
21 assist him.

22 THE COMMISSIONER: Mr.
23 Goudge, do you want to add anything to this?

24 What do my rulings say
25 about -- did I say you have to supply an outline or
26 a synopsis.

27 MR. GOUDGE: I think the
28 word used, sir, was "synopsis". There is no
29 doubt, sir, that that's important for the smooth
30 running of the Inquiry. I think all counsel

1 realize that, all counsel have benefitted from the
2 pre-filing that has been conducted by some of the
3 parties, particularly Arctic Gas. That makes
4 cross-examination much easier, there's no doubt about
5 that. I think it should be also recognized, however,
6 that there are certain constraints that may apply
7 on other parties that make it a little more difficult
8 to provide the same kind of full synopsis, if you
9 will. That doesn't mean that they shouldn't make
10 an effort and I know that Mr. Anthony is aware of
11 the need to do that. I would have thought, however,
12 the practical result that falls on each of us is
13 that should it prove as a result of hearing evidence
14 for which there may be a claim of inadequate synopsis,
15 that cross-examination is difficult, that point can
16 be made by whichever counsel feels that at the end
17 of the evidence in chief and presumably the result
18 would be a request to you, sir, that that witness
19 be recalled for cross-examination on the basis of
20 what would then be a full hearing of his evidence.
21 I think perhaps it is a little premature until
22 counsel hear his evidence to know whether in fact
23 they are able or unable to cross-exam. The whole
24 point of the synopsis is to facilitate cross-examination.
25 It may well be, however, that on hearing evidence
26 for which there is an inadequate or even no
27 synopsis, cross-examination is possible. On the
28 other hand, counsel may feel after hearing that
29 evidence that it is not possible and I would have thought
30 that if they do, they'd raise it with the Commission

THE COMMISSIONER: Well, the State of Alaska has nothing to do with this Inquiry. I am sure these are witnesses who because of their willingness to co-operate with Canadian Arctic Resources Committee have agreed to come, they

1 don't represent the State here --

2 MR. MARSHALL: Well,
3 they're both state officials.

4 THE COMMISSIONER: The
5 state isn't represented here. Well, we've heard
6 Territorial Government employees who have spoken
7 to the Inquiry, they're not representing the Territorial
8 Government. We've heard Federal Government employees.
9 They don't represent the prime minister or anybody
10 else.

11 MR. MARSHALL: Well, sir,
12 the information that has been given to me today
13 by Mr. Anthony is that the witnesses are going to
14 present the position of the State of Alaska on
15 pipeline routes, and that's in the outline of
16 evidence that Dr. Weedon who is a state official.

17 I don't want to belabour
18 the point, but it seems to me that --

19 THE COMMISSIONER: Well,
20 let me put it this way, the State of Alaska isn't
21 represented before this Inquiry. That's the -- it
22 may be that these people have been asked to come
23 and have agreed to come, and -- but this Inquiry has
24 absolutely no jurisdiction over the State of Alaska
25 or over anyone or anything in Alaska and if
26 they have agreed to come, as a gesture of good
27 neighbourliness to assist the Inquiry, I may say
28 that I am anxious to hear them unless there are
29 reasons for not hearing them that are entirely
overwhelming.

1 MR. MARSHALL: Well, sir,
2 as you know there are other regulatory proceedings
3 going on at the same time. The State of Alaska is
4 an intervenor in the hearings before the Federal
5 Power Commission.

6 THE COMMISSIONER: I know
7 that there are other regulatory proceedings not
8 going on at the same time.

9 MR. MARSHALL: Yes, I
10 appreciate that. The point that I am making is I
11 think if these witnesses are appearing and there has
12 not been a compliance with the rulings with respect
13 to furnishing synopsis of their evidence which I
14 submit is the case, that we should be entitled an
15 assurance that they will present themselves again
16 if we or other parties feel it is necessary to
17 cross-examine them.

18 THE COMMISSIONER: All right,
19 what I am going to do is this: the -- I think Arctic
20 Gas has in every instance that I can think of gone
21 the last mile in complying with my rulings so far as
22 providing synopses are concerned. I think that
23 Mr. Anthony's point that it is in some respects more
24 difficult for Canadian Arctic Resources Committee
25 to comply with the rulings, at least to the same
26 extent as Arctic Gas has done is a point well made.
27 It appears from what you gentlemen say that there
28 has been an imperfect adherence to my rulings by
29 Canadian Arctic Resources Committee in this instance.
Nevertheless, I want to hear these witnesses from

1 Alaska. The question whether they can be recalled
2 I propose to resolve in this way: if you decide you
3 wish them recalled, I will use my good offices to
4 see if they can be persuaded to return on an occasion
5 convenient to them, and that is really all I can
6 do.

7 Failing their return, if you
8 do in fact seek to have them returned, then the point
9 you've made is one that really can only go to the
10 weight of their evidence. I am not, I think, in a
11 position to refuse to hear them.

12 MR. MARSHALL: Well, thank
13 you very much, sir. I appreciate your statement and
14 I suppose when all the smoke clears I may well agree
15 with everything they say.

16 THE COMMISSIONER: Well, there
17 you are.

18 MR. MARSHALL: Well, then
19 again I may not.

20 Mr. Anthony, can I carry on?

21 MR. ANTHONY: I wonder then
22 if we can -- before we proceed to the cross-examination,
23 just to conclude yesterday evening, I noticed, Dr.
24 Geist, you didn't give the -- your concluding
25 statement as a result of where your views led in
26 particular with respect to the question of alternate
27 routes and studies you feel might, should be conducted,
28 and perhaps you could just take a moment to make
29 your position known so that there is no doubt before
30 cross-examination commences.

V. Geist
In Chief
Cross-Exam by Marshall

1 A Well, the conclusion
2 that I had reached yesterday, I wrote -- I had written
3 down and it reads as follows:

4 "Prima face evidence exists to seriously
5 consider the study of the Fairbanks
6 corridor as an alternate route to
7 the prime route from the view of
8 wildlife proclamations."

9 I put in brackets that as far as I can see:

10 "The criterion for decisions ought
11 to be the ability to replace
12 any damaged resources."

13 MR. ANTHONY: Thank you.

14 I believe that Dr. Geist can now be questioned by
15 my friend.

16 CROSS-EXAMINATION BY MR. MARSHALL:

17 Q Dr. Geist, one of the
18 subjects you addressed was the productivity, which,
19 as I understood your evidence, you say decreases
20 with both latitude and altitude and you commented
21 on the Yukon in effect sloping up to the St. Elias
22 Mountains in the south.

23 A In which case that's
24 right, the productivity decreases.

25 Q Just looking at these
26 various maps that we see spread around, there are
27 a number of other mountain ranges in other parts
28 of the territory are there not?

29 A By all means. Yes.

30 Q And is it not correct,

1 then that one must really compare altitudes, various
2 altitudes at the same latitude in order to assess
3 relative activities.

4 A That was my very
5 point, sir.

6 Q When you were talking
7 about the caribou, as I recollected your evidence
8 you commented on them using some otherwise useless
9 plans and converting this into a source of protein
10 in a form that could be used by man.

11 A Strictly anthropocentric
12 viewpoint, yes.

13 Q I take it it must be,
14 sir, because --

15 A Absolutely --

16 Q -- surely no plant is
17 useless, thinking of such things is perhaps --

18 A From the human viewpoint
19 it can be.

20 Q Perhaps in terms of
21 achieving soil stability and so on --

22 A In this case it is also
23 from the human viewpoint.

24 THE COMMISSIONER: In this
25 case it is what?

26 A It is also from the
27 human viewpoint.

28 THE COMMISSIONER: Yes.

29 A In trying to achieve
30 soil stability for your purposes.

MR. MARSHALL:

V. Geist
Cross-Exam by Marshall

1 Q Well, that interests
2 me, sir, because of some expressed concerns about the
3 effects of siltation on fish --

4 A Mm-hmm --

5 Q It is not just a human
6 concern, the stability of the terrain is important
7 because of fish resources and various other things.

8 A I agree.

9 Q What I am getting to
10 is it's really not fair to say that even a humble
11 weed is completely useless. It may well serve
12 some important purpose in -- it may serve a number
13 of purposes depending on --

14 A That depends on --

15 Q -- what we are thinking
16 of.

17 A That's right, it depends
18 entirely on your point of view.

19 Q And it may particularly
20 be important in matters such as soil stability.

21 A It may be, yes.

22 Q Sir, you commented on
23 the caribou being in a positive energy budget on
24 the North Slope and a negative energy budget in
25 their wintering range.

26 I gather your specialty, or
27 one of your specialties is animal behaviour.

28 A My specialty, sir,
29 is the biology of ice age mammals, large ice age
30 mammals.

V. Geist
Cross-exam by Marshall

1 Q Would it follow with
2 this positive energy budget on the North Slope, the
3 caribou there would perhaps be less susceptible to
4 stress than they would in their winter range when
5 their energy budget is a negative one?

6 A Not necessarily, sir,
7 not at all. For the simple reason. For instance,
8 you may be in a very positive energy budget. But
9 that positive energy budget may be disrupted by something
10 like mosquitoes, and when that happens we have
11 mosquitoes and we know that from work that has been
12 done in Russia, it can be so severe that it can kill
13 the animals, and in that case of course, the best
14 food resources in the world don't help if the mos-
15 quito problem is a very serious problem. I should
16 maybe have mentioned that, that a very important
17 factor, an enormously important factor in maintaining
18 the positive energy balance of the caribou is to
19 find a spot during summertime where they can escape
20 the fly pest, insect pest, and there are some statements
21 in the literature that strong winds, particularly
22 from the sea, might be instrumental in keeping
23 this pest down, that is the Russians have presented
24 evidence to the effect that up to 125c.c.'s a
25 day of blood may be drawn from the caribou by
26 mosquitoes alone. They could be in other words
27 enormously susceptible to harassment at the time
28 when you would think that they are in a positive
29 energy budget, on the summer range.

30 Q It appears whatever the

1 degree of harassment on the summer range it is not
2 so high as to prevent them from feeding and getting
3 to the point where they are in a positive energy
4 budget.

5 A On the contrary, sir.
6 -- On the contrary, sir. The degree of harassment
7 of insects, for instance, alone, before the human
8 disturbance comes in, can be so high that they go
9 off feed completely, that in fact they have internal
10 upsets of the Ubermazim (?) which happens to be
11 the true stomach.

12 Q My point is that as
13 they're using the North Slope to feed, it must
14 follow, mustn't it, that they don't find the degree
15 of harassment there so high so as to leave them
16 to abandon that area for feeding.

17 A At the present time I
18 would say, yes, that would be the case.

19 Q Now, sir, I have
20 reviewed your curriculum vitae and note that you
21 are an expert particularly in sheep, that you've
22 done a great deal of work on mountain sheep --

23 A Yes --

24 Q You have films and books
25 and numerous articles to your credit --

26 A Yes.

27 Q And I am told by my
28 advisors that you are considered to be a leading
29 expert on sheep, and it's with that in mind I note
30 with interest your comments as to their resiliency

V. Geist
Cross-Exam by Marshall

1 and non-susceptibility to disturbance by human
2 activities. In that I would like you to elaborate
3 on that a bit, sir.

4 A Gladly. Did I not make
5 a proviso? Non hunting?

6 Q You may well have, sir,
7 the hour was running on.

8 A Well, that's a very im-
9 portant one.

10 That is a very, very
11 important proviso. If you do not hunt these animals,
12 they are incredibly resilient to human disturbances,
13 as long as they can find out that human beings do
14 not disturb them in any way, shape or form, or for
15 that matter they will very soon take advantage of the
16 presence of human beings and some of our qualitatively
17 best sheep populations happen to be in highly disturbed
18 areas.

19 Q Such as ?

20 A Banff National Park at
21 the Timberline Hotel where the mountain sheep take
22 advantage of road cuts which have been seeded and
23 fertilized, take advantage of seeded and fertilized
24 lawns take advantage of tourists who are there with
25 handouts, take advantage of ski slopes, cleared and
26 with first class forage available, yes, sir, that's
27 your first class mountain sheep.

28 Q That's where we have
29 all the accidents with the tourists travelling through

V. Geist
Cross-Exam by Marshall

1 tame sheep.

2 A Yes, we do have, as a
3 matter of fact the point is, that I would like to
4 put is; if you have sheep and humans coming into
5 contact and these animals are habituated to the
6 human beings I would be afraid for the human beings
7 after awhile, not for the mountain sheep, because
8 to be slugged by a lamb is the equivalent of being
9 slugged by a twenty-pound sledge hammer.

10 Q Well, it is an experience
11 I wouldn't welcome, I am sure.

12 A I haven't welcomed it
13 either, I have been slugged twice.

14 Q I take it then that
15 you are not particularly concerned about construction
16 activities taking place near sheep populations,
17 provided men aren't out there with rifles taking
18 shots at the animals.

19 A That is almost correct.
20 I would have to add another proviso to that, and
21 that is that the construction activity doesn't start
22 at once. In other words, you can go and you can, if
23 you start it gradually, the animals will return and
24 it depends very much on the kind of behaviour that
25 human beings do show at the construction site.

26 Q Well, with, for example,
27 pipelining --

28 A Mm-hmm --

29 Q And there are survey
30 crews that go in first and stake out the line and so

on and then clearing crews and then the major construction activity follows after that with the pipelaying, I take it then that this could give them an opportunity to observe what was going on and they wouldn't, in your judgment, be frightened away?

A Well, not quite that, again there's a few too many "if's" involved in this. It has to be a relatively slow process of acclimatization, and then the habituation does set in and the animals do in fact ignore, or for that matter, even take advantage of the human activities.

Q What about noise, sir, they seem to be able to adapt to noises as well?

A Absolutely, they do adapt to noises very well. They dislike intensely very loud noises, but if these loud noises are repetitive and are associated with a positive stimulus they adapt very readily to it. They will stand within six inches of trucks moving at 50 miles an hour.

Q Really?

A Yes, and will just side step these trucks in order just to be missed, and one of the lambs that I knew, for instance, suffered the tragic accident, his horn grew two inches too large, and his head was taken off, he miscalculated one day. I would like to point out that this was known for the last ten years.

Q I see, well, then I take it that a compressor station wouldn't really

1 cause you great concern then in the point of view
2 of sheep?

3 A Not at all.

4 Q Sheep could learn to
5 live with and like compressor stations.

6 A Yes, absolutely.

7 Q What about aircraft
8 flights, sir?

9 A That depends again on
10 the rate of overflight and the behaviour of the
11 aircraft. You just can't simply make a statement
12 about, well, they're going to habituate the aircraft.
13 If you go and buzz these animals regularly, you
14 in fact are going to cause a very, not only severe
15 disturbance, I would say, you are going to cause
16 a severe loss in the productive effort of these animals,
17 because you are going to cause a jack up in the cost
18 of living to an extent that is unbearable and
19 intolerable to these creatures.

20 Q Well, this is really
21 a harassment I suppose.

22 A Oh, yes, it is harassment.

23 Q -- or maybe an over
24 eager biologist wanting to get closer to study them.

25 A It's not the over eager
26 biologist, but I have been on many flights where all
27 of a sudden I found myself in the position of being
28 over mountain sheep because of over eager pilots
29 trying to get close, trying to take photographs or
30 just trying to be friendly to me, showing off their

V. Geist
Cross-Exam by Marshall

1 mountain sheep, you know, bzzzzzz ---

2 Q Sir, if the
3 pilots behave themselves do the mountain sheep or
4 do sheep generally seem to be bothered by air-
5 craft overflights?

6 A Sir, do you realize that
7 you have made quite an if? "If" the pilots behave
8 themselves. I have more confidence in the nature of
9 sheep than in humans.

10 Q I see. Well, if --

11 A If we lived in a perfect
12 world, yes, they would not -- they would not mind
13 the aircraft flying over. They will, depending on
14 the rate of overflights, that's the whole problem.
15 They will go into cliffs, they are going to show all
16 sorts of signs of excitation, they are going to stay
17 in cliffs away from feeding areas for awhile and
18 this is an important point because we talked about
19 energy budgets, and to these animals energy is a
20 difficult thing to get and it is very easily lost and
21 harassment costs a hell of a lot of calories.

22 Q I suppose in your
23 extensive studies that you've carried out in the
24 Yukon on sheep, you've had opportunities to observe
25 them behave in the presence of aircraft.

26 A Yes, I have.
27 Not so much in the Yukon.

28 Q And is it correct
29 that if the aircraft is not harassing the sheep
30 your observations would be that the sheep seem to be

1 tolerate that type of activity?

2 A Well, as I said, it
3 depends on the rate of overflights. If you have
4 airplanes flying all day long, steadily over the
5 animals they ignore them completely, of course.

6 Q Well, in your judgment
7 if there were two or three flights per week at
8 a thousand foot altitude over the sheep, you think
9 that would be an intolerable disturbance to Dall
10 sheep?

11 A You know, I wish I
12 could really answer that question, give you a nice,
13 definitive answer, but that requires a study, in
14 this case, which unfortunately has not been carried
15 out for the very simple reason that in order to
16 carry this sort of study out would require some
17 special things and I would like to testify to that
18 a little bit later, but believe me, sir, I would
19 like to answer that question.

20 Q I take it in any
21 event you are much less concerned about infrequent
22 straight overflight than you would be with harassment,
23 that follows,

24 A On the contrary, it's
25 just these darned infrequent flights that I am con-
26 cerned about, because it is the rare phenomenon that
27 excites animals, not the frequent, not the common,
28 not the predictable. It is the unpredictable and
29 rare that stimulates anxiety, pardon me, please,
30 this is a human term, but which does seem to relate

V. Geist
Cross-Exam by Marshall

1 excitement, excitation, which is a more physiological
2 term.

3 Q And that would be, say,
4 the first occasion in which the animals came into
5 contact with an ^{aircraft} overflight?

6 A It may be a repeated
7 occasion, it just is rare enough and the point is
8 how rare enough, that we don't know.

9 Q I see. This is something
10 that hasn't been studied.

11 A No. That hasn't been
12 studied -- pardon me, the principle has been studied
13 many times, it's the psychological principle I am
14 referring to, many, many times. It is a well estab-
15 lished principle, but it hasn't been studied in the
16 case of mountain sheep.

17 Q Do I fairly conclude
18 from your remarks, sir, that insofar as sheep are
19 concerned, you are not really that concerned with
20 pipeline construction?

21 A On the contrary, I am.
22 I am. I am sitting right now -- it would be a night-
23 mare for me to consider the Fairbanks -- not the
24 Fairbanks -- the Fort Yukon Corridor, for instance.
25 The way the thing has been laid out, the pipeline
26 has been laid out, it's, and I am afraid, I have
27 to assume a road here, because we are in mountainous
28 terrain, I am terribly afraid for the last decent
29 populations of Stone sheep for instance that are in the
30 Yukon Territory and the Glenlyon Range --

1 THE COMMISSIONER: That is the
4 Fort Yukon route.

3 A That is the Fort Yukon
4 route, correct. I was asked a general question and
5 am responding just to give him a specific example.
6 I would be terribly frightened because of the popula-
7 tions in the St. Cyr Range which would be effected
8 in that case as well, for the populations in the
9 Dawson Range, as a matter of fact our last populations
10 that live right along the rivers would be effected by
11 that Fort Yukon Corridor, I am quite afraid
12 for these animals, because they are not moving
13 into an area that is close to hunting, in this
14 case, and I don't think that necessarily these areas
15 ought to be closed to hunting but I do believe that
16 wild sheep are a resource that ought to be utilized.

17 Q Do I understand from
18 your comments that your concern would be with
19 respect to any permanent road that might give
20 access to hunters in these areas and the populations
21 might be decimated?

22 A I would say to hunters
23 in combination with hikers, in combination with
24 all sorts of other activities because it strains
25 the ability of an animal to distinguish between
26 a man with a rifle and a man without, and we are
27 talking here a bit about the synergistic effect
28 too.

29 Q I wonder, sir, if
30 you could tell us, moving from the topic of sheep,

V. Geist
Cross-Exam by Marshall

1 something about your work with caribou.

2 A My work with caribou,
3 I have been able to observe caribou in the years
4 of 1961 to 1963 while I was studying Stone sheep
5 in the Spatsizi of Northern British Columbia.
6 The caribou I was observing at that time, not working
7 with, I was working with mountain sheep primarily.
8 Caribou I observed, very interesting animals, so I
9 have spent some time looking at them, are the
10 Osborne Caribou and ever since that time I have
11 maintained an interest in the Osborne Caribou and
12 wherever I have gone in the Yukon on my trips in
13 connection with I.B.P.C.T. I have always kept careful
14 watch on the animals and their signs.

15 I have reviewed the work
16 of the biology of caribou I think reasonably well,
17 for the very simple reason that I am intensely
18 interested in that animal. I have told you that my
19 interests are the ice age mammals and the caribou
20 is a splendid example of ice mammals and it is for
21 this reason that I have gone through various litera-
22 tures in order to and match it against my own
23 observations, in order to obtain, let me call it,
24 the adaptive syndrome of this animal. I have written
25 that up and I will be perfectly glad to provide it
26 for you, that work. It is in one of our reports.
27 It's in the Wolf Lake report which is cited in
28 my curriculum vitae, that report I will gladly let
29 you have a copy of.

Q Sir, are there other

1 studies that you have undertaken on caribou that --
2 just checking through your curriculum vitae I didn't
3 really notice particular studies on that.

4 A No, I have not under-
5 taken any other studies except for the conceptual
6 studies which means that I have been attempting
7 to make sense out of diverse, unrelated observations
8 and tried to put them into a logical framework
9 and I think I have succeeded in doing that.

10 Q This hasn't found its
11 way yet into a paper.

12 A It has found its
13 way definitely into a paper and I intend to
14 publish this, except that this Inquiry came along
15 somewhat early, I never thought that you would
16 have liked to have that verified in essence by
17 my peers. I have no hesitation to submit that
18 though to peer review, nonewhatsoever.

19 Q I am sure we'd be in-
20 terested in having a look at it, sir.

21 I take it then from your
22 remarks that you are familiar with the literature
23 pertaining to caribou that is available?

24 A I would say I am
25 quite familiar with it, yes.

26 Q Would that include any
27 of the work done by Renewable Resources in the
28 last number of years pertaining to the Porcupine
29 Caribou herd?

30 A I have read that part --

1 yes, I have read some of that work and I have not
2 on the other hand read every single detail of the
3 work that has been done, rather I have limited
4 myself to those areas that would at any one time
5 be of particular interest to me and I would like
6 to state that I hope to testify of this at a later
7 date.

8 Q I take it their work
9 has been available to you.

10 A Yes, it has been avail-
11 able, yes.

12 Q Sir, you mentioned the
13 40 mile herd which --

14 A Yes, I did.

15 Q -- previously occupied
16 parts of the south Yukon and has since disappeared.
17 My recollection was that you stated that the
18 herd extended into the -- in part into the east
19 Yukon, MacMillan River and Pelly Rivers?

20 A Into the MacMillan
21 River and Pelly River, yes.

22 Q I am just wondering, sir,
23 how you were able to establish that the caribou
24 in those areas were part of the 40 mile herd.

25 A It's simply on the basis
26 of the syndrome as a whole. The information that
27 I obtained was from one of the long time residents
28 of the MacMillan-Pelly Rivers area, the Van Biber(?)
29 family, and they did discuss with me when I brought
30 up this matter, because I was quite interested,

V. Geist
Cross-Exam by Marshall

1 whether in fact the migratory caribou at any time
2 did show up in the McArthur Range, because the McArthur
3 Range happens to be one of our -- one of the areas
4 we have proposed as an ecological reserve and it is
5 one of the areas where we spent a considerable amount
6 of time in. For this reason I tried to interview
7 people that had lived in that range. How do we
8 know that these are caribou of the 40 mile herd?
9 We don't, of course. Not any more.

10 Q There are no specimens
11 to be examined so as to verify it that way?

12 A The only thing that you
13 can say is that I trust fully the statement by
14 a man who has lived a long, long time in the McArthur
15 Range and makes the statement, yes, they are the
16 smaller caribou, and quite different from the large
17 caribou, of course I know what you are talking
18 about, because I know what caribou -- what mountain
19 caribou look like versus what the barren ground
20 caribou look like. I don't think there is a hope
21 here of confusion. I perfectly trust these people.

22 Q The reason I raise this
23 is the information I had from my advisors was that
24 there were mountain caribou in this area.

25 A There are still
26 mountain caribou in this area, yes.

27 But how does a mountain
28 caribou differ from a barren ground caribou? Is that
29 the question that you are asking me?

30 Q No, I didn't ask that

1 question.

2 THE COMMISSIONER: Well, I'll
3 ask it.

4 A By in large the
5 mountain caribou tends to be a larger animal which
6 has some diagnostic features on the antlers and the
7 rump patch as well as the colouration involved.

8 The difficulty with caribou
9 on the other hand is that I don't think when you
10 see one animal, let us say, or two animals, that you
11 can very readily at a distance make a statement
12 as to exactly what you are seeing, so you have to
13 start looking around for such characteristics as
14 dropped antlers, for instance and see whether for
15 instance the antler tends to be round, or whether
16 it tends to be flat in the beam; the flat antler
17 tends to be more diagnostic of the woodland --
18 not the woodland caribou -- yes, the woodland caribou
19 definitely, the mountain caribou. There are also
20 such things as the overall formation of the antlers.
21 For instance, the Osborne Caribou by in large in the
22 bulls, they tend to have a short beamed, rather heavy
23 beamed antlers with a relative large number of
24 points. They are in their antler structure somewhat
25 intermediate between the woodland caribou, which
26 have shorter and flatter antlers still, and more
27 spread than the barren ground caribou which tends
28 to have very tall antlers with a palm or just a
29 series of points sticking out at the top.

Now, the manner in which

V. Geist
Cross-Exam by Marshall

1 barren ground caribou were distinguished at the time
2 when they in fact met woodland caribou, is strictly
3 on the basis of size, also the colouration of the
4 barren ground caribou tended to have a little bit
5 more white on the side and tended to have a slightly
6 larger rump patch, and in fact we have here one
7 of our chief experts on caribou, sitting, who has
8 written in fact a very important work on this line
9 which is still being used.

10 Q He wasn't referring to
11 me, sir.

12 A No, I was referring
13 to Dr. Banfield who is one of our pioneers in the
14 studies of caribou.

15 Q I take it that it is
16 somewhat of a difficult task for a layman to identify
17 various types of caribou from the description that
18 you have given.

19 A If you just look at
20 one caribou?

21 Q Yes.

22 A One at a time?

23 Q Yes.

24 A Yes, but not if it
25 is when you have the barren ground caribou and
26 the mountain caribou in the range at the same time.

27 Q Or if you have a specimen
28 to examine.

29 A Even that I would con-
sider is difficult except in a very, very clear cut

1 case. For instance, I don't know what the dickens
2 is sitting in the centralized range today. I don't
3 think enough specimens have been shot and examined
4 to really give a very good, sound statement on
5 what happens.

6 Another trouble is that
7 caribou like any other large mammal tend to change
8 shape and behaviour as a function of the range
9 and actually the environment that they live in, there
10 are a lot of troubles in this line. Taxonomy is not
11 an easy subject.

12 Q Sir, just getting back
13 if we can to the disappearance of the 40 mile herd.
14 I'm informed that the herd is alive and well and
15 living in Alaska. We were discussing briefly earlier
16 the biological, the work of Renewable resources and
17 what you might be interested in taking a look at,
18 given your interest in caribou is volume seven of the
19 Biological Report series. It's entitled "Distribution
20 and Movements of the Porcupine Caribou Herd in
21 Northeastern Alaska 1972."

22 A What page is it?

23 Q There are several
24 pages. The first that you might be interested in,
25 sir, is page six, figure one which gives the
26 approximate location of main caribou herds in
27 Alaska and you'll note in the legend that --

28 A How old is that figure,
29 that table?

30 Q The report is dated

1 February of 1974.

2 A No, sir, I am asking
3 about the distribution of caribou in Alaska. On
4 whose work is that based?

5 Q I am told it is based
6 on Hemming's 1971 work.

7 A Okay.

8 Q The legend shows the
9 location of the 40 mile herd. The second figure
10 in that volume at page seven gives the caribou
11 regions in Alaska and adjacent Canada from Skoog,
12 S.K.O.O.G., 1968.

13 A That's right.

14 Q And then there is a table
15 at page eight which gives shifts in the distribution
16 of both the Porcupine caribou herd and also the
17 40 mile herd. The 40 mile herd's history or
18 distribution being dealt with from the late 1800's
19 through 1964. You might be interested in taking a
20 look at those references, sir.

21 A Thank you.

22 Q Excuse me just a moment,
23 sir.

24 MR. MARSHALL: I think, sir,
25 those are all the questions that I have.

26 THE COMMISSIONER: Thank you.
27 Mr. Hollingworth, any questions?

28 MR. HOLLINGWORTH: No questions,
29 Mr. Commissioner.

30 THE COMMISSIONER: Mr. Bayly?

1 CROSS-EXAMINATION BY MR. BAYLY:

2 Q Dr. Geist, because it
3 was late last night I just wanted to make sure that I
4 had got clear in my mind the thrust of your concern
5 on the Porcupine Caribou herd and if I can go over
6 three points and ask you if I interpreted your
7 remarks correctly and the first of these is, I under-
8 stand, the north slope, for the purpose of caribou
9 and other animals and birds is a very productive
10 area for the period of time that it is used as a
11 feeding and breeding ground.

12 A That is correct, sir.

13 Q And that for that reason
14 that it is critical to interrupt migrations of, say,
15 the Porcupine Caribou herd when they are on their
16 way to the ground because it is so necessary for
17 them to rebalance their food supply to keep them
18 healthy animals throughout the year.

19 A Yes, I tend to agree
20 with that statement.

21 Q And you base that on
22 the, for example, study that was done in New Zealand
23 where interruption can be caused to these animals
24 by certain mechanical and other means which will cause
25 them to stop using a range and that is the reason
26 for that kind of concern, that it could happen.

27 A It is based on a much
28 more extensive body of knowledge than that. It is
29 based on examination of work plus work which I have
30 carried out myself on highly social animals and the

1 manner in which migration and movements in fact take
2 place. I have published them, that.

3 Q All right. Now,
4 the one thing that I am not sure whether you went
5 into yesterday or not is that for the purposes of
6 their winter range, now food is sparser, is it also
7 as critical to disturb them while they are wintering
8 as it is to disturb them on their summer range?

9 A Yes, sir, it is.

10 Q And that would be for
11 different reasons, I take it?

12 A No, it is for -- yes,
13 well, different reasons in the sense that it is the
14 same reason 180 degrees reversed. In one
15 case you are preventing the accumulation of material
16 and I spoke of energy and the form of fat, minerals,
17 vitamins, probably protein as well; and in the
18 other case we are talking about the expenditures of
19 these materials, so you could hasten expenditures
20 of the winter range and we do have a pretty good
21 understanding of, I would say, mortality of the bulls
22 which tends to be highest when they are forced to
23 expend their budget prematurely.

24 Q All right, one of the
25 concerns that I have with regard to the Porcupine
26 Caribou herd is whether or not there has been any
27 investigation into the caribou and their relation
28 to their range in this respect. Is there a way of
29 determining how many caribou there should be in the
30 Porcupine Caribou herd in order to maintain the

1 herd, because I think that is a critical question
2 if any kind of development --

3 A Sir, you have opened
4 up a bag of bees, literally. That is one of the most
5 difficult, difficult questions to answer that I know
6 of. In fact, I don't think that there is any answer
7 at present available for it. I am aware of various
8 attempts at modelling with computers the size, the
9 optimum sizes of herds, but I can only state at the
10 present time I must be ignorant on that.

11 Q All right. I take it
12 from what you have said earlier that you have --
13 you are very well read on this subject and can we
14 assume then that the state of that particular area
15 of research is at a very simplistic or low level?

16 A No, you actually
17 stated it right out of my heart, but I am not sure
18 that other colleagues would agree with it. I
19 think it is.

20 Q You think it is at a very
21 low level?

22 A Yes.

23 Q And would you say that
24 that is a critical thing to know to understand whether
25 or not this particular Porcupine Caribou herd could
26 withstand certain disturbances and still recover.

27 A In the ultimate sense,
28 yes. In the approximal sense I am afraid we are
29 going to have to run by the seat of our pants at
30 times, yes. Because we really don't know how

V. Geist
Cross-Exam by Bayly
Cross-Exam by Veale

1 caribou herds expand and even go to extinction at
2 times, although hunting is a factor, and disturbance
3 somehow is a factor, but we still have a long ways
4 to go to understand those functions and mechanisms;
5 and disturbance and expansion of movement and
6 geography of the caribou is not dependent at all
7 on the population dynamics, at least that is what
8 I expect at the present time.

9 MR. BAYLY: Those are all
10 the questions I have, thank you.

11 THE COMMISSIONER: Mr.
12 Bell?

13 MR. BELL: I have no
14 questions, Mr. Commissioner.

15 THE COMMISSIONER: Mr. Veale.

16 CROSS-EXAMINATION BY MR. VEALE:

17 Q Dr. Geist, there are
18 a number of routing considerations that arise out
19 of some of the statements that you have made and
20 you may or may not be in a position to comment on
21 further routing matters and please advise.

22 For example, you stated that
23 further study of the Fairbanks corridor is merited.
24 You are aware, I assume that the intention of the
25 Applicant is that a supply lateral from the Mackenzie
26 Delta would come across the Dempster Highway.

27 A That's right.

28 Q What is your comment
29 on that because that goes over one of the most
30 important overwintering grounds of caribou?

V. Geist
Cross-Exam by Veale

1 A Sir, if I have not
2 made it clear I would like to do it right now. I
3 have not that much quarrel with the pipeline down
4 the Mackenzie from the viewpoint of wildlife, that is,
5 from the areas of my own competence. I have a
6 heck of lot of quarrels with it going across the
7 North Slope as well as that so called Mackenzie spur
8 down to Dempster and if there were two evils I would
9 have to choose between, I would vote against the
10 offshore route.

11 THE COMMISSIONER: You mean
12 the coastal route.

13 A The coastal route.
14 Pardon me, the coastal route, yes, the prime route
15 to Prudhoe Bay.

16 MR. VEALE:

17 Q You are taking the
18 position that the lesser of two evils would be to
19 come down the Dempster Highway then, is that ?

20 A I hate to admit it,
21 yes.

22 Q There are also caribou
23 involved on the Alaskan side of the Fairbanks
24 corridor as well. Is that another case of the
25 lesser of two evils?

26 A Yes, of course, because
27 as it said in the -- and as it indicated yesterday,
28 I assumed that the damage will have in essence been
29 done already by the Alaska Highway and the Alyeska
30 route.

1 Q Is that the position
2 then that you would apply to the existence of
3 small mountain herds or woodland caribou along
4 other areas of the Fairbanks corridor as well?

5 A Yes, indeed, I would
6 because as I said the disturbance, or for these
7 animals at least, has already taken place. They
8 do cross the road periodically, but you do have
9 to go off the road some distance in order to meet
10 them.

11 Q A position then, if
12 I can return to the prime versus the Fairbanks
13 route, would be that -- are you making a judgment
14 call when you state that passing through the calving
15 ground is more serious than passing through the
16 overwintering ground of the Porcupine herd?

17 A It is not just the
18 calving grounds, that is what I was trying to raise.
19 It is not just calving grounds. It is the nursery
20 area and it is not just a nursery area of the
21 caribou. It is a nursery area for a lot of other
22 creatures as well, and what I am afraid of is
23 exactly such things as oil spills taking place in
24 that area, activities that are well beyond the appli-
25 cants' control, although I have not the slightest
26 doubt of the very best intentions of the applicants,
27 nonewhatsoever.

28 MR. VEALE: Thank you.

29 THE COMMISSIONER: Mr. Goudge.

30 CROSS-EXAMINATION BY MR. GOUDGE:

V. Geist
Cross-Exam by Goudge

1 Q Dr. Geist, dealing
2 with your answers to both Mr. Veale and Mr. Bayly,
3 because of the state of the art concerning population
4 in caribou herds, are you prepared to venture an
5 opinion as to the effect on net productivity of
6 the caribou herd of the prime route along the coast?

7 A Sir, there are so many
8 if's in that equation that it would take a very
9 great number of years of very intensive studies
10 to determine that because just simply the fluctuations
11 of weather alone can mask or enhance unfairly
12 whatever effects the prime route may have. I am
13 afraid, yes, that there is going to be an effect,
14 in essence a decrease of the herd probably due to
15 loss of range, possibly due to loss of energy due
16 to excessive movements in one way or another, but
17 I would like to talk about this in some detail at
18 another date, if I may.

19 Q Yes, sir. Dealing
20 with the I.B.P. sites which you have shown me and
21 which are shown on the map, just so I'll understand
22 it, have some but not all of those proposed been
23 dealt with by the government and set aside by the
24 Government?

25 A Not at all, sir. The
26 only thing -- what we have from the government is
27 a statement of support in principle by the Minister
28 of Indian Affairs and Northern Development and
29 Mr. Buchanan. We have a committee -- the Government,
30 pardon me, has set up a committee at the present

1 time which is asking us to submit individual proposals
2 and these proposals will be dealt with and eventually
3 we hope that ecological reserves will be established
4 in the Yukon and Northwest territories.

5 My main reason, however,
6 in bringing out this map is regardless of actions
7 taken by anybody, there are some areas in the
8 Yukon Territory which we would like to bring to the
9 attention of the Commission that we as a panel have
10 considered very valuable indeed. This is the opinion
11 of a group of scientists that have been working, as
12 I have said, for the last seven years in this area
13 and we venture this opinion that regardless
14 whether they will ever obtain protected status or not,
15 these are some areas that require special consideration
16 and we hope we rely on the good judgment of the
17 Applicant, and he has demonstrated these in the past.
18 I am just delighted to say that we have had very
19 good co-operation from oil companies and I think
20 that the Applicant has done very well indeed on the
21 prime route.

22 Q None of the proposed
23 I.B.P. sites have received official protection,
24 am I correct in that?

25 A Yes -- well, some of
26 the I.B.P. sites are within the national park
27 now. I don't know what the status of that national
28 park is, Kluane National Park, I believe it
29 should be established very soon, but permanently there
30 are some I.B.P. sites inside it and of course they

1 are protected, but they will probably receive a
2 special status within the park itself.

3 Q Yes, on the basis of
4 your general views concerning your area of expertise
5 you have said that you prefer the Fairbanks route.

6 A Yes, I do.

7 Q You have some diffi-
8 culty with the other routes.

9 A Well, at the present
10 time, prima face evidence.

11 Q Could you deal with the
12 ranking of the four routes that we have talked about
13 on the basis of their compatibility with the proposed
14 I.B.P. sites. What would you say your rankings
15 were?

16 A Totally out---
17 I would say, to me, good heavens, you are asking me
18 to choose between the devil and the deep blue sea
19 at times, and I would put it as follows. I would
20 prefer the -- if a gas pipeline were to be built,
21 I would prefer the Fairbanks corridor, above
22 everything there comes nothing for a long time and
23 I would say the prime -- pardon me, not the
24 prime route, but the next one below it --

25 Q The interior route --

26 A The interior route,
27 yes, would be next and I have a very hard time
28 making a value judgment between the prime route
29 and the Fort Yukon route.

30 Q And you would hold to

V. Geist
Cross-Exam by Goudge
Cross-Exam by Marshall

1 that ranking in light of the rating of the effect
2 on the I.B.P. site?

3 A Let me put it put it,
4 I would say yes with one qualification. I will
5 fully agree that my knowledge, my expertise is
6 limited. There may be factors that further investi-
7 gations will reveal which will cause me to change
8 my mind. I haven't seen them today and what I
9 am claiming is that the prima face evidence at the
10 present time permits me to make only this qualified
11 statement that I have given to you.

12 MR. GOUDGE: Thank you,
13 I have no more questions.

14 CROSS-EXAMINATION BY MR. MARSHALL (CONTINUED):

15 Q Sir, just one question
16 arising out of this last couple of questions. Mr
17 Goudge was asking you, I understood him to be
18 asking you to evaluate the various routes as they
19 relate to I.B.P. sites.

20 A Oh, I am sorry --

21 Q I was wondering
22 whether your answer was that or whether it was an
23 overall evaluation.

24 A I am sorry, it was
25 an overall evaluation.

26 Q What about the routes
27 in relation to the I.B.P. sites. Are there conflicts?

28 A Well, let me put it this
29 way, some of the I.B.P. sites that we have selected
30 are representative sites that can be duplicated

V. Geist
Cross-Exam by Marshall
Cross-Exam by Goudge

1 elsewhere and the beauty of the I.B.P. site, in
2 fact, in connection with a pipeline is that it
3 gives us a magnificent opportunity for study. So
4 I did not -- I hope not-- but maybe I did imply
5 rather strongly, that I meant that I.B.P. sites were
6 to be avoided. Oh, no, not necessarily. It depends
7 on the individual sites involved.

8 CROSS-EXAMINATION BY MR. GOUDGE (CONTINUED):

9 Q Perhaps then I could
10 ask you, sir, in terms of the I.B.P. sites which
11 you've proposed, would your ranking of the routes
12 differ from the one you gave me earlier?

13 A No, I don't think so.

14 MR. GOUDGE: Thank you.

15 THE COMMISSIONER: Any
16 re-examination?

17 MR. ANTHONY: No re-examina-
18 tion.

19 THE COMMISSIONER: Before
20 you go, Dr. Geist and perhaps since Dr. Banfield
21 is still with us, he might feel free to comment
22 on this too.

23 Dr. McTaggart-Cowan was
24 a witness back in June, I think it was. He said
25 that this Porcupine Caribou herd was one of the
26 last four great herds on earth, and the Fairbanks
27 corridor, if that were adopted, and there were
28 to be no coastal or interior route, that is, if
29 American gas were to be taken out on the Fairbanks
30 route to the United States and some other system

V. Geist
A.W.F. Banfield

1 were used for taking Mackenzie Delta gas out, the
2 whole object of this evidence we've heard the
3 last day or two seems to be to demonstrate that
4 those arrangements would offer a much better chance
5 of preserving this herd. Now, Dr. Banfield I think
6 disputed that yesterday at least in some measure and
7 so did Mr. Hemstock, but that is the theory that
8 Mr. Anthony is advancing.

9 Now, two of those other
10 herds are in Canada, I understand and one in Alaska,
11 is that right?

12 A I think so, yes.

13 Q Do you have any comment
14 on that, Dr. Banfield?

15 ALEXANDER WILLIAM FRANCIS
16 BANFIELD,
17 resumed,

18 WITNESS BANFIELD: A Sir, I am
19 at somewhat of a disadvantage, you realize, in my
20 position before you. I am not sure what I am entitled
21 to say. I think my evidence has been misinterpreted
22 by you, sir.

23 Q Well, fine, if it has,
24 please comment now. I hope you don't mind, Mr.
25 Marshall --

26 MR. MARSHALL: No, sir,
27 I certainly don't.

28 THE COMMISSIONER: Dr.
29 Banfield is one of the witnesses who is going away
30 and whether he's -- Scotland is just about as bad
as Alaska, the writ of the Inquiry doesn't run there.

V.Geist
A.W.F. Banfield

1 A Well, I don't think
2 that any of the legal counsel here asked me a question
3 exactly the way that you did. This is why I have
4 trouble in recognizing your summary of my evidence.

5 Q Well, forgive me. I was --
6 it was a kind of shorthand and I fully intend to read
7 and re-read your evidence, and I remember your
8 evidence well, but it seemed to me though that
9 Dr. Geist was saying if we took the Fairbanks route
10 and avoided the coastal route and the interior route,
11 that would be best all round, without trying to put
12 a sharper point on it than that, and at any rate,
13 you go ahead and comment. We are all fresh this
14 morning and --

15 A Yes, I am a good deal
16 fresher than I was last night or this morning,
17 I should correct myself.

18 I do have a small technical
19 argument with Dr. Cowan's testimony. It was a
20 mere lapse on his part, it is not the fourth largest
21 in the world. In fact documentation presented by
22 Dr. Calef in an E.P.B. report which Dr. Cowan
23 was using would indicate that there are several
24 herds in Siberia that are larger. What he really meant
25 to say was that it was the fourth largest in North
26 America. This is a small technicality.

27 Q Yes.

28 A And I understand now
29 that you are asking me to comment on the relation-
30 ship of some new alternative that you're proposing?

V. Geist
A.W.F. Banfield

1 Q No, no, no, I am not,
2 forgive me, I am not. Let me put it this way; I
3 have no doubt that Dr. Geist and you would agree that
4 the Porcupine Caribou herd is a biological resource
5 that ought to be preserved.

6 A Oh, very definitely so.

7 Q And I am sure that
8 everyone in this room agrees with that. Leave the
9 Fairbanks route out of it. The significance of that
10 route that's being put forward here this week appears
11 to be that among other things, some of those other
12 things, such as the wishes of the Old Crow people
13 are to be weighed very seriously, but among other
14 things, it offers less interference with the herd
15 we are told than the coastal route or the interior
16 route would.

17 Now, all I am asking you
18 is, as someone who doesn't have the knowledge of
19 Dr. Geist and you, what other herds of caribou that
20 are comparable exist in North America and the
21 rest of the world.

22 A Well, there are several
23 others, even in Alaska. Of course there is a larger
24 herd, and that is the Western Arctic group that
25 will be menaced by any major development in the
26 Naval petroleum 4 reserve. If there is a develop-
27 ment of that field, that will be a primary impact
28 upon that very large herd. Prudhoe Bay is actually
29 on the margin of that herd and that herd, I think,
30 can carry on without --

V. Geist
A.W.F. Banfield

1 Q Prudhoe Bay is on the
2 eastern margin.

3 A Yes, sir. Elsewhere
4 the Bluenose Lake herd which is the next herd immediately
5 to the east and occurs in the Horton River, Anderson
6 River down to, summering up on the coast there and
7 wintering down north of Great Bear Lake, that herd
8 has had a remarkable resurgence recently and I am
9 now just offering a comment on one of the alternative
10 routes that has, I felt hopefully, we would be
11 discussing today, was to move the corridor, the
12 Mackenzie Valley Corridor some distance eastward.
13 There were two proposals, one was east of Franklin
14 and one was the edge of the shield, and the evidence
15 supporting these of course was more in the area
16 of terrain and I just wanted to point out that there
17 was no attempt in Dr. Rhodes presentation to
18 evaluate it environmentally and there would be
19 very severe concern expressed by wildlife biologists
20 that any route in that area would move right into
21 the heartland of another important caribou herd.

22 Q How many animals are
23 there in the Bluenose herd?

24 A Well, sir, I am divul-
25 ging somebody else's information. I learned it only
26 a few days ago in Inuvik. The estimate is 100,000.

27 Q The same size as the
28 Porcupine.

29 A Approximately the same
30 size and it seems to have grown, Dr. Geist was

V. Geist
A.W.F. Banfield

1 speculating on, we don't know why, maybe from bleeding
2 off from the next herd over which is the Bathurst
3 herd, but the Canadian Wildlife Service who are the
4 authorities in this area are not sure that they
5 can identify an equal loss in the numbers of the
6 Bathurst herd and there is a strong feeling that it's
7 an internal growth of the Bluenose herd.

8 I don't mind responding
9 really to your question about alternatives, and
10 as I had to give a correction to some of my previous
11 evidence, when we are discussing all these alternatives,
12 I am perhaps not quite quick witted enough, but I
13 always lose sight of all these long lateral legs and
14 so that when somebody talks about the Fairbanks
15 Corridor I tend to simplistically fix into this
16 Alaska Highway thing and I --

17 Q Well, I think that we
18 have been discussing the Fairbanks Corridor essentially
19 on the basis that it would take Prudhoe Bay gas and
20 that some other system would be used for Mackenzie
21 Delta gas and that there would not be a Dempster
22 Highway leg coming down to join it at Whitehorse.
23 My understanding of the evidence of the panel last
24 night was that they proceeded on that assumption,
25 is that right?

26 MR. ANTHONY:
Are you speaking in
27 terms of Dr. Thompson's panel?

28 THE COMMISSIONER: Yes.

29 MR. ANTHONY: I am not sure. My
30 understanding certainly is -- their comments may

V. Geist
A.W.F. Banfield

1 have been in the same context as Dr. Banfield's.

2 THE COMMISSIONER: Well,
3 carry on, Dr. Banfield.

4 A Well as far as on
5 your model, which now I understand, --

6 Q Well, it is not my
7 model, I am just trying to see what everybody
8 is driving at.

9 A Well, a hypothetical
10 situation, there is no doubt but what that would
11 be a happy event as far as the Porcupine Caribou
12 herd would be concerned.

13 Q Well, I don't -- I hope
14 you don't think that I am intolerably ignorant of these
15 matters, but so much has been said about this Porcupine
16 herd that I am curious to know to what extent
17 Canada is so to speak the trustee of this animal.
18 We have the Porcupine herd, the Bluenose herd,
19 do we have any other herds that -- were they threatened,
20 would they lead people like Dr. Geist and yourself
21 to be as concerned as I am sure you both are?

22 A Well, it is a matter
23 of degree of concern. I think that Dr. Geist can
24 speak for himself. I think he would be equally
25 concerned if the Kaminuriak herd was threatened
26 by polar gas -- pipeline proposed down the west
27 side of Hudson Bay. He can speak for himself. There
28 are other herds and they have threats perhaps ahead
29 of them in their futures.

30 Q Dr. McTaggart-Cowan said

1 four great herds in North America. You said the
2 Western Arctic, ^{the Porcupine,} the Bluenose, and you mentioned
3 one that inhabits the Keewatin, and what did you
4 call that herd?

5 A Well, no, this is Kaminuriak.
6 It is named after the lake that they fawn around. Oh,
7 dear, it gets into some dreadful English construction.
8 It is not the fourth largest, The Beverly Lake,
9 Beverly herd which is more in the central area is
10 even larger and this is perhaps the best known
11 of all the herds historically because it was in a
12 pathway of exploration across the main part of the
13 barren grounds.

14 I have difficulty in
15 being less concerned or less interested in any herd.
16 As for the responsibility, I think we share it
17 equally with our neighbours from Alaska, the
18 moral responsibility to preserve this fantastic
19 resource which I agree with. I believe it was
20 Dr. Leonard who said that it is a site only rivaled
21 in the Sarangetti Plains. It is something like
22 that. We share that responsibility and because of
23 its relative isolation up until only recently, perhaps
24 there is, as Dr. Geist in explaining his interest in
25 Pleistocene large mammals, perhaps it has a slight
26 edge on some of the other herds that have learned,
27 they're accomodated to withstand heavy human, Native
28 utilization during their post Pleistocene history.
29 may I say a couple more words?

30 Q Yes.

V. Geist
A.W.F. Banfield

A The Yukon Native --

Q Council of Yukon

Indians.

A C.Y.I. They had a very interesting map on the wall which indicated that in fact the density -- I would like to be a lawyer someday, I'd like to question Dr. Geist on this, but the density of human population appears to have been greater in the southern Yukon, I would have liked to have asked him whether he thought that the density of human primitive populations was an indication of productivity, but we'll talk about this in the corridor, but in any event I think it indicated that the Native population in the northern Yukon has been light and you can also say in the contiguous areas of Alaska. Historically and prehistorically the population seems to have been fairly thinly scattered, and I believe that the Porcupine Caribou herd has had this most advantageous history in light utilization, whereas the Eskimo populations along Hudson Bay and along the Arctic Coast eastward and the Indian populations on the treeline have traditionally harvested an appreciably larger percentage of the other herds that we have been talking about.

Q One thing that you said.

I suppose someone will come along here during the course of these hearings and say, "Well, the Porcupine herd, even if we do interfere with it, we have still got these other herds. You mentioned that the herd in the Keewatin might well lie in the path of a

1 pipeline from the high Arctic along the west coast
2 of Hudson's Bay. I got that right?

3 A Yes, sir.

4 Q And that is a herd of
5 comparable numbers to the Porcupine, is it?

6 A I am not very good
7 at retaining numbers. Perhaps there is enough
8 documentation lying around. It is in a number of
9 tables. I think it is smaller. I think it is
10 80,000 or 90,000.

11 Q I see. Do you want
12 to answer that question that Dr. Banfield --

13 WITNESS GEIST: A The
14 size of these various caribou herds? I don't know --

15 Q the one about the --

16 A Oh, the human populations,
17 yes, there is one thing that is absent from the
18 map, the Eskimo settlements on the coast.

19 Q Well, I think that you
20 both should have been lawyers.

21 THE COMMISSIONER: Well,
22 thank you, Dr. Geist, very much, and I hope that
23 you will be able to rejoin your family on your holiday.

24 (WITNESSES ASIDE)

25 MR. ANTHONY: Mr. Commissioner,
26 we propose next to call the two witnesses from
27 Alaska. One point that my friend Mr. Marshall
28 mentioned before that perhaps we could settle
29 before they give evidence and that is, with respect
30 to the statement to Alaska's position before the F.P.C.,

R.B. Weedon
W. Parker

1 In fairness to the witness, I should say that I asked
2 them to include that because I thought that it would
3 be of assistance to the Inquiry to at least have on
4 record what the position is that the State has
5 taken, and I indicated that they would be filing
6 the statement they filed with the F.P.C. and I
7 assumed that that would therefore give everybody ample
8 notice of what they were going to say.

9 Now, from their point of
10 view they are not here to defend or argue the case
11 before the F.P.C. There will be ample opportunity
12 for that argument at the F.P.C. They are merely
13 here to have this information before the Inquiry as
14 background. If my friend is going to object to
15 that information coming in, I would -- it is coming
16 in at my request, not the State's, and if he
17 wishes to take a strong point on that, the witnesses
18 may be prepared to forego that, but I would think
19 that that sort of information would be of assistance
20 to us.

21 THE COMMISSIONER: Well,
22 carry on. I don't think that there is any problem
23 here.

24 MR. ANTHONY: Dr. Weedon and
25 Mr. Parker.

26 ROBERT B. WEEDON,
27 WALTER PARKER, sworn.

28 MR. ANTHONY: Mr. Commissioner,
29 the panel you have before you are two gentlemen
30 who are here at the request of the Canadian Arctic

1 Resources Committee to provide this Commission with
2 some information of the sorts of considerations
3 that they kept in mind in dealing with the question
4 of alternate route selection and we have asked them
5 to appear not as advocates of the State's position
6 as much as giving an indication of the sorts of
7 consideration and the sort of things that they
8 kept in mind so that we would have that as back-
9 ground to our deliberations here.

10 The gentleman with the
11 natty polkadotted shirt is Dr. Robert Weedon, and
12 the gentleman beside him is Mr. Walt Parker.
13 Perhaps I will start with the introduction of Dr.
14 Weedon.

15 DIRECT EXAMINATION BY MR. ANTHONY:

16 Q Dr. Weedon, a biographical
17 note outlining your education and experience was
18 circulated with your synopsis of evidence. I wonder
19 if you would just highlight that synopsis so that
20 we have an indication of your background and
21 education.

22 WITNESS WEEDON: A Thank
23 you, Russ, and Mr. Commissioner. I am a down east
24 Yankee from New England, born and raised in
25 Massachusetts, obtained a degree in wildlife conserva-
26 tion from the University of Massachusetts and a
27 second degree in wildlife conservation from the
28 University of Maine. I had a longing all my life
29 to go both north and west. My first very short move
30 from Massechusetts to Maine was northward. I then

1 went westward quite a long distance and spent
2 two years at the University of British Columbia,
3 a student of Dr. Cowan's, working with ptarmigan
4 and my studies with ptarmigan brought me into the
5 north country. I spent a year in 1958 and '59
6 teaching biology at Washington State University
7 while I was preparing for several great events in
8 my life. First of all to come to Alaska to make
9 my home permanently, secondly to wait for my
10 wife to get finished with her work at the University
11 of British Columbia so that we could -- my proposed
12 wife -- and then we could get married, and third,
13 to make my major move northward.

14 I made that move northward
15 in July of 1959 and have resided in Alaska ever since
16 for this following 16 years. I joined the Alaska
17 Department of Fish and Game the year after statehood
18 or during that same year, and worked for the Alaska
19 Department of Fish and Game as a research biologist
20 from July of 1959 to August of 1969. In August
21 of 1969 I was much concerned about the very rapidly
22 changing events, and oil and gas resource discoveries
23 and the very clear probability of rapid growth in
24 Alaska's population. I sought a somewhat different
25 base of operations, I left the Alaska Department
26 of Fish and Game and I left my biological studies.
27 I worked for nine or ten months as an Alaska repre-
28 sentative for three conservation groups, the
29 Alaska Conservation Society, the Sierra Club and
30 the Wilderness Society. I discovered one of my many

1 failings was that I am not a supersalesman which
2 is one of the demands of that particular job and
3 I decided to try yet another forum. I joined the
4 University of Alaska in July of 1970 as a Professor
5 of Wildlife Management. I also decided at that
6 time that I did wish to continue my thinking and
7 studies in the broader field of natural resources and
8 the character and nature of Alaskan society both
9 present and future. Accordingly I had a joint
10 appointment at the University with the Department of
11 Wildlife and Fisheries, with the Department of
12 Land Resources and Agricultural Science and with an
13 institute that we fondly call the Institute of
14 Everything, which is the Institute of Social, Economic
15 and Government Research at the University of Alaska.

16 When Governor Hammond was
17 elected last November or perhaps it was December, I
18 am not sure when the final count came down, Governor
19 Hammond asked me to join his administration as the
20 Director of a new division of policy development and
21 planning which is in the office of the Governor and
22 serves mainly as the provisor or the provider of
23 recommendations to the Governor on matters of policy
24 and the provider of information for planning purposes
25 to all of the 15 or 16 line agency or departments of
26 the state government. I have been in that position
27 since January first of this year.

28 MR. ANTHONY: I believe,
29 also, Dr. Weedon, that you are a member of the
30 Alaskan Environmental Advisory Board, would you

R.B. Weedon
W. Parker

1 describe what that Board is and your responsibilities
2 there?

3 A I was, am not now, a
4 member of the Alaska Environmental Advisory Board.
5 That was a board -- is a board of citizens appointed
6 by the Governor to advise the Department of Environ-
7 mental Conservation, now one of the major line
8 organizations or agencies of state government.
9 When I joined state government, however, it was
10 inappropriate for me as a state official to be on that
11 board and I resigned.

12 Q I believe you also
13 are a consultant with the joint Federal State
14 Land Use Planning Commission. I wonder if you
15 could describe that Commission and what its functions
16 are.

17 A The joint Federal State
18 Land Use Planning Commission for Alaska is a body
19 set up following a provision of the Alaska Native
20 Claims Settlement Act of 1971. The joint Commission
21 as its name indicates is a combined body of represen-
22 tatives of the federal and state governments for the
23 purpose of seeing to it that the very complicated and
24 occasionally ambiguous or conflicting provisions
25 of the Alaska Native Claims Settlement Act were
26 discussed openly with federal, state and Native
27 organization officials. The Commission was to
28 provide a forum for the mediation of any conflicts
29 that arose. It was to provide a mechanism whereby in-
30 formation on resources which of course were critical

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1 to the selections of land by each of the parties,
2 state, federal and native groups, critical to the
3 selection of these lands by those groups. The joint
4 Commission has also served as a mechanism for
5 holding public hearings on policy matters such as
6 the transportation corridors questions, the matter
7 of new methods of handling mineral exploration and
8 development in the State of Alaska and many similar
9 kinds of issues that surround the resolution of
10 both native land claims and the management of lands
11 by state, federal and native organizations.

12 Q Thank you. Mr.
13 Parker. Again, you've had a biographical note that
14 has been circulated with your evidence and both
15 will be as exhibits in this Inquiry. Will you
16 please highlight your education and experiences in the
17 State of Alaska.

18 WITNESS PARKER: A Yes,
19 after service in World War II I served briefly with
20 the United Nations, arrived in Alaska in December
21 of 1946, attended the University of Alaska, with
22 an undergraduate degree in history, a major in
23 anthropology and later, much later, did graduate
24 work at Maxwell School for Public Administration
25 at Syracuse University, a degree in political science,
26 and at the Sino-Soviet Institute at the George
27 Washington University.

28 After leaving the University
29 of Alaska in 1948 I moved into the Alaska bush,
30 lived for nine years at Lake Minchumina Alaska.

1 where I worked for the Civil Aeronautics Administration
2 and did some field research for the then Nasent(?)
3 program in wildlife management at the University of
4 Alaska and many other things such as charter flying
5 and the host of methods by which one maintains a living
6 in the Alaska bush, especially during those years.

7 I moved to Anchorage in 1957,
8 went to work for the Federal Aviation Administration.
9 With them I began as an air traffic controller,
10 wound up as their evaluation officer, went to
11 Washington, D.C. in 1966 with the same organization
12 and took a position in System Requirements, returned
13 to Alaska in 1968 as Planning Officer for the Federal
14 Aviation Administration where my primary responsibility
15 was North Slope operations. The move from there
16 to the Federal Field Committee for Development Planning
17 in Alaska where I was the senior staff advisor with
18 special responsibilities and transportation and co-
19 ordination of environmental programs.

20 The Federal Field Committee
21 was eliminated by President Nixon in 1971. I left
22 the Federal service, went to the University of
23 Alaska as a research associate. In the Institute of
24 All Things which Dr. Weedon referred to previously,
25 Social, Economic and Government Research, and also
26 worked in the sea grant programs primarily in law
27 of the sea and international fisheries matters.

28 Last year when the state
29 pipeline office was set up I moved from the university
30 to work in the state pipeline office as Director of the

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1 technical staff which was the staff that had the
2 primary responsibility for design review of the
3 Alaska Pipeline on state lands and as environmental
4 consultant to the Governor on general overall
5 environmental concerns affecting the pipeline.

6 In December Governor Hammond
7 asked me to be Commissioner of Highways which I
8 accepted and which I have been involved ever since.

9 Q Do I understand correctly
10 that part of the functions of the Commissioner of
11 Highways is to act as the engineer, shall we say, for
12 the state and the other departments?

13 A The Department of
14 Highways represents most of the Engineering strength
15 in the state structure and the more complicated
16 engineering problems for the other departments are
17 handled by contract with the highways, yes.

18 Q Thank you.

19 Mr. Commissioner, Mr. Parker
20 just flew in by chartered plane this morning to be
21 with us and his statement is now being photocopied.
22 I would -- am prepared to have him proceed with
23 the statement in advance of its copying or -- I am
24 instructed that it should be just a couple of
25 moments, so I am in your hands in that regard.

26 THE COMMISSIONER: Well,
27 let's see now, we'll adjourn for maybe fifteen
28 minutes and have a cup of coffee and then start
29 with a clean slate.

(RESUME OF ROBERT B. WEEDON MARKED EXHIBIT 175)

(RESUME OF WALTER PARKER MARKED EXHIBIT 176)

(REPORTS RELIED ON MARKED EXHIBIT 177)

(PROCEEDINGS ADJOURNED FOR FIFTEEN MINUTES)

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: Well,
ladies and gentlemen, let's take our seats and we
can hear Dr. Weedon's presentation.

MR. ANTHONY: Mr. Commissioner,
copies of Dr. Weedon's position have now been distri-
buted to the participants and one has left with
you and Miss Hutchinson and therefore it's filed as an
exhibit.

(PREPARED TESTIMONY OF DR. ROBERT B. WEEDON MARKED
EXHIBIT 178)

MR. ANTHONY: Dr. Weedon, would
you perhaps commence with a description of what
environmental criteria were used for route evaluation
and the significance of these criteria.

WITNESS WEEDON: A The en-
vironmental criteria which were applied to the Alaskan
Arctic Gas Pipeline Company route alternatives
represent our most critical concerns for the immediate
midterm and long term environmental impacts of the
proposals. These criteria or our judgments on those
criteria are themselves based on a familiarity with
the Alaskan portions of the proposed routes and an
assessment of the environmental problems which may be
anticipated on the basis of Alaska's experience with
northern development.

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The specific criteria are listed below here, I will come to those in a moment. Most of these relate directly to at least two of the route alternatives and so I would like to discuss them in a general context to avoid repetition and because I understand that details of these environmental factors and concerns are most appropriately given at a later stage of the Inquiry. Among these factors, first the nature of river and stream crossings, the alteration of stream hydrology, the quality of water and the necessary borrow pits for the extraction and use of gravel.

Number two, permafrost conditions, the factors being the slumping, subsidence or mass wasting or heaving of soil and other permafrost degradation phenomena.

Third, the alteration of wildlife habitat and other disturbances to wildlife which may cause detrimental behavioural or physiological responses.

Fourth, the significant changes which may occur to or irreversible commitments of lands which by the nature of the change or these commitments, eliminate future planning and management options.

Number five, revegetation of disturbed areas and the requirements for continued maintenance of revegetated and disturbed areas.

Number six, the consequences of repair and maintenance activities and of the non-

1 removal or removal of the pipeline when its use is
2 no longer needed.

3 Other criteria are to be in-
4 cluded as they relate to specific routes. For
5 example, avoidance of traditional calving or over
6 wintering areas for caribou as well as other critical
7 wildlife habitat areas, the association of routes
8 with populated areas, that is, areas of human population
9 and settlement, the association of routes with es-
10 tablished transportation facilities which Mr. Parker
11 will largely dwell on, the avoidance of existing and
12 prospective wilderness areas, the location of
13 borrow sites for gravel mining, and the availability
14 of water for both domestic or settlement use as well
15 as for snow and ice road construction and other
16 developmental uses.

17 Now, in the course of my
18 testimony I would like to use and table a number
19 of exhibits and I would like to take a moment to
20 explain those, Mr. Commissioner, to the members
21 here. The first of the exhibits is the Alaska -- is
22 one of a series of six volumes proposed to provide
23 a fairly detailed regional atlas for the State of
24 Alaska. The particular regional profile which I have
25 here, and it's of particular interest, is the Arctic
26 region and I will table this report, this profile,
27 leave it with the Commission. It's replete with both
28 text and statistical and illustrative material, both
29 photogrpahs and maps which outline to the best of
30 our current knowledge the existing situation in the

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1 Alaskan Arctic with respect to both natural factors,
2 climate, soils and so on and developmental factors
3 such as engineering constraints and possibilities,
4 settlement patterns, transportation routes, local
5 government and so on.

6 The second of the exhibits
7 which I would like to table is one of a long series
8 of volumes produced by the staff of the Joint Federal
9 State Land Use Planning Commission in Alaska which
10 I described earlier. This particular volume of the
11 set called resources of Alaska is a regional summary
12 of resources of Alaska, once again with both text and
13 tabular and illustrative material about the resources
14 of the State of Alaska.

15 A third exhibit is a map
16 produced by the Joint Federal State Land Use Planning
17 Commission for Alaska entitled, "Major Ecosystems of
18 Alaska." The information used to indicate ecosystems
19 on that map is largely the distribution of different
20 kinds of plants, the vegetation cover, and so all of
21 the different colours on that map indicate different
22 kinds of vegetation which reflect soil and climate
23 and which then in turn are the basis for the distribu-
24 tion patterns of different sorts of animals and hence
25 by using vegetation you can indicate an entire type
26 of ecosystem with which you are dealing. On this
27 particular specimen of that map, I have added the
28 approximate routings of the TransAlaska gas pipeline
29 proposed by El Paso Gas Company and the several routes
30 that have been discussed at these meetings, these

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1 hearings as alternative routes for the TransCanada
2 gas pipeline originating in Prudhoe Bay.

3 A fourth map is visible now
4 on this board and it is a land status map of Alaska,
5 produced in 1974 by the Bureau of Land Management of
6 the United States Department of the Interior. I
7 might add that the status of lands, that is, the
8 patterns of land ownership in Alaska are changing
9 far more rapidly than the mapmakers can keep up with
10 them, so when you look at a map of this sort you have
11 to ask what was the date of the information and how
12 much has changed in the hours or days or weeks since
13 then. However this map will give you an approximate
14 idea of the state ownership, the federal ownerships
15 and the lands designated for eventual transfer in
16 fee simple ownership to both regional native corpora-
17 tions and village corporations.

18 The fifth exhibit which I would
19 like to table now is a draft environmental assessment
20 written by the State of Alaska recently this spring
21 for a proposed Beaufort Sea or Beaufort Islands leasing
22 program in the salt water just offshore of Prudhoe
23 Bay. The exact title is "The Proposed Beaufort Sea
24 Near Shore Petroleum Leasing Report", and this
25 report discusses with particular reference to a
26 proposed oil and gas development, it discusses the
27 environmental factors of that fairly large stretch
28 of coast mainly from Flaxman Island at the mouth
29 of the Canning River westward to the mouth of the
30 Colville River, that being the area in which the

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1 state was considering a petroleum leasing activity.
2 I think that the Commission will find these documents
3 of some use as they proceed in their Inquiry.

4 THE COMMISSIONER: Thank you
5 very much, Dr. Weedon. Those will be marked in
6 due course. We appreciate your taking the trouble
7 to bring them with you.

8 MR. ANTHONY: Dr. Weedon, would
9 you go on to explain the significant land use con-
10 siderations which you perceive as pertaining to the
11 available route option.

12 A The proposed Alaskan
13 Arctic Gas pipeline Company pipeline system will
14 establish or would establish a new pipeline corridor
15 in the north, that is, there is no existing pipeline
16 corridor in use within northern Alaska. There is
17 an existing pipeline withdrawal and I think that that
18 has probably been mentioned before at the hearings.
19 I might just take a moment just to point that out
20 on the map. That withdrawal was made several years
21 ago and was an attempt during the time of consideration
22 of the Alaska Native Claims Settlement Act to make
23 sure that there would be an eastern trending exit
24 for natural gas or oil out of Alaska if one were needed,
25 that is, no land problems or problems with land
26 proprietorship would stand in the way of the use of
27 that particular corridor, because it has been withdrawn
28 by the federal government.

29 Q And that corridor, am
30 I right, is the location of the proposed Interior

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1 Route for the Arctic Gas natural gas pipeline?

2 A Yes, that is correct.

3 Associated with this proposal
4 is the establishment of new air and possibly or
5 probably road transportation in Alaska where none
6 now exists. Development of gas pipeline, road and
7 air transportation net associated with the gas pipeline
8 will promote the future establishment of related
9 facilities and possibly including new oil and gas
10 pipelines. The location of the proposed pipeline
11 corridor facilities could in turn lead to the develop-
12 ment of oil and gas within the Arctic National
13 Wildlife Range as well as the Beaufort Sea Offshore
14 Province specifically and could influence the develop-
15 ment of the entire Alaskan arctic coastal area inclu-
16 ding Naval Petroleum Reserve Number 4, which lies
17 to the west of the Colville River and encompasses
18 approximately 23 million acres.

19 Accordingly, the proposed
20 Alaskan Arctic Gas Pipeline Company system would have
21 a significant impact on statewide land use planning
22 as commitments will have been made for both transporta-
23 tion and population distributions in the Arctic prior
24 to the development of a land use plan or policy for
25 the Arctic and let me say here that neither the state
26 of Alaska nor the federal government has any firm
27 and well articulated Arctic policy or Arctic land
28 use plan.

29 In Alaska we have a type of
30 local government, two types of local government.

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W. Parker
In Chief

1 Those of you familiar with the system in the other
2 49 states probably know that we have a system of
3 municipal governments and a system of county governments
4 in those states. In Alaska we have many settlements
5 which are not incorporated and have no government. We
6 have some settlements that are incorporated as
7 municipalities and then instead of counties we have
8 boroughs and these boroughs range in size from
9 rather small in the case of the Anchorage borough,
10 to very, very large ones in the case of the North
11 Slope Borough, and in fact the North Slope Borough
12 encompasses essentially the entire land north of
13 the crest of the Brooks Range, right all the way
14 across from Cape Lisburne to Kaktovik, Barter Island.

15 The North Slope Borough, a
16 brandnew local government entity in the state of
17 Alaska, has accepted the charge of area wide planning,
18 platting and zoning. This new borough, however, is in
19 the formative stages of preparing a plan to implement
20 these responsibilities and as of next week I will be
21 going to Barrow to talk with the local people about
22 how far they have progressed in these plans, but as
23 yet, not only have the state and federal governments
24 no land use plans for the Arctic, but neither has
25 the local government entity.

26 Q Perhaps you could assist
27 us by explaining what "platting" is.

28 A Platting is simply the
29 expression on maps of the boundary lines of proposed
30 land ownerships and the exact layout of access and so

R.B. Weedon
W. Parker
In Chief

1 on.

2 Kaktovik has not recieved title
3 to lands it selected under the provisions of the
4 Alaska Native Claims Settlement Act.

5 THE COMMISSIONER: Excuse me,
6 where is Kaktovik?

7 A Kaktovik is on Barter
8 Island, it is the native settlement on Barter Island
9 right almost at the Canadian border.

10 Thus, we don't know right at
11 the moment what effect any of the proposed Alaskan
12 Arctic Gas Pipeline Company routes would have on
13 land use planning by the Kaktovik people.

14 The proposed prime route crosses
15 an area of state ownership for which no land use
16 plan has been prepared. This area in the Prudhoe
17 Bay and vicinity, is developing rapidly into major
18 petroleum exploration and extraction area under
19 the overall direction of the state as landowner and
20 the North Slope Borough. The proposed gas line would
21 increase the likelihood of exploration and leasing
22 of state owned lands offshore from the Arctic National
23 Wildlife Range. Perhaps I should explain to the
24 Inquiry that in Alaska under the Statehood Act, the
25 State of Alaska received title to all lands from
26 mean high tide mark to the three miles out
27 from the shoreline, thus the State is the owner of
28 tide lands and submerged lands immediately outward
29 from mean high tide. From there -- from that point
30 three miles outward to a point twelve miles outward,
the federal government assumes proprietorship.

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1 There are then major implications to overall state
2 land use planning of the proposed system because
3 the pipeline system could commit state owned gas
4 for example, for export without use elsewhere in
5 Alaska. The state retains the ownership of twelve
6 and one half per cent of all natural gas produced
7 on state lands in the state and this we call our
8 royalty gas and if there were a system proposed for
9 the use of gas out of Alaska in the north, it's
10 extremely likely that this gas and the royalty gas
11 would have to be exported with no chance of use any-
12 where in the State of Alaska.

13 The Executive Mandate for the
14 Arctic National Wildlife Range is to protect unique
15 wildlife, wilderness and recreation values. On
16 December 18, 1973, the Secretary of the Interior
17 recommended that the existing Arctic National Wildlife
18 Range and 3.76 million acres to the south of the
19 proposed Alaskan Arctic Gas Pipeline Company system
20 be established by the Congress as a new 12.7 million
21 acre Arctic National Wildlife Refuge. It was further
22 recommended by the Secretary of the Interior that
23 within three years after the status of the existing
24 range was changed to a refuge by the Congress, that
25 the Secretary would submit his recommendations on
26 the suitability or non-suitability of the area for
27 inclusion in the National Wilderness Preservation
28 system.

29 Counsel, would it be desirable
30 for me to explain briefly the National Wilderness

R.B. Weedon
W. Parker
In Chief

1 Preservation system?

2 Q Perhaps if you could so
3 we could get an idea of the effect of this classifi-
4 cation.

5 A Mr. Commissioner, in 1964
6 an act was passed by Congress in Washington es-
7 tablishing the National Wilderness Preservation sys-
8 tem. That system was comprised at that particular
9 time of 54 specific areas encompassing 9 million
10 acres, none of which are in Alaska, that regardless
11 of their former ownership, whether they were in
12 national forests or whether they were in national
13 park or some other federal ownership, they would
14 henceforth be units of this National Wilderness Pre-
15 servation system. They would remain roadless, they
16 would remain with a very minimal amount of resource
17 development activities, the purpose being then to
18 preserve for all time the wilderness character of
19 those lands rather than subjecting them to the
20 alternate management strategy of so-called multiple
21 use. The Act also left open for future congressional
22 designation any further federal lands which met
23 the requirements or the standards of the Act, and
24 it has been proposed that many millions of acres in
25 Alaska be placed by Congress in this national
26 wilderness system, and the Arctic National Wildlife
27 Range, possibly to become the National Wildlife
28 Refuge would be recommended for that kind of status:
29 permanent designation as a wilderness area.

30 Accordingly, the proposed

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1 pipeline system, the alternatives at least which
2 cross or impinge on the present or expanded Arctic
3 national Wildlife Range, would pre-empt wilderness
4 designation of this part of the Arctic Wildlife
5 Range. I say that because pipelines are an incon-
6 sistent feature with respect to wilderness. Any
7 area that had a pipeline crossing it would have to be
8 excluded from any area designated as wilderness
9 by definition. It's often facetiously said that
10 Congress's definition of wilderness is a place where
11 the hand of man has never set foot. We consider the
12 impact of the prpoposed pipeline crossing of the
13 Arctic Wildlife Range as a major and adverse impact
14 on land use planning for the Arctic Wildlife Range.

15 There is no comprehensive land
16 use plan in existence for gathering lines and pump
17 stations for the Prudhoe Bay, Kemik, or Kavik
18 fields or for the connection, interconnection of those
19 fields. There is no plan for relating these fields
20 with Petroleum Reserve Number 4 to the west or poten-
21 tial oil and gas fields to the east.

22 The Marsh Creek anticline, a
23 fairly well known and tantalizing geological structure
24 which is in the Canning River and Marsh fork areas,
25 mainly within the Arctic Wildelife Range, and the
26 Beaufort Sea are both considered to have very good
27 potential for substantial oil and gas deposits. The
28 Marsh Creek anticline according to some geologists
29 could approach the size of the Prudhoe Bay field
30 itself, while the Beaufort Sea Offshore Province is

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1 considered by the state of Alaska to contain estimated
2 speculative reserves of 2.7 billion barrels of oil
3 and 13.5 trillion cubic feet of gas. Arctic Gas
4 recently predicts that the proposed Alaska Arctic
5 Gas Pipeline system (communications, pipeline, air-
6 fields, and port areas) will stimulate exploration
7 and development of oil and gas along the Alaskan
8 Arctic coast.

9 Assuming that there are
10 significant deposits of oil and gas discovered in the
11 Marsh Creek anticline and the easter Beaufort Sea,
12 it will be necessary to construct an extensive system
13 of gathering lines from wells to pump and processing
14 stations, roads and living quarters. These develop-
15 ments would be on a scale comparable to Prudhoe Bay
16 depending on the ultimate size of the new fields.
17 These new facilities would be located within the
18 western and northern portions of the calving
19 grounds of the Porcupine Caribou herd. It is further
20 assumed that any major network of gathering and
21 pump stations would connect to the Alaskan Arctic
22 Gas Pipeline Company facilities at the closest reason-
23 able place instead of the initial facilities now
24 in existence at Prudhoe Bay. Accordingly the proposed
25 pipeline would adversely affect land use planning
26 within the Arctic National Wildlife Range and as a
27 worse case conditions could result in severe losses
28 to the Porcupine Caribou herd converting its
29 traditional calving area to an interconnected maze of
30 wells, feeder lines, processing plants, pump stations

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W. Parker

In Chief

1 and housing facilities.

2 In summary, the impact of the
3 proposed prime route is considered to be severe and
4 adverse since it commits land uses in the absence
5 of a comprehensive statewide or regional plan. This
6 is especially important since the proposed pipeline
7 invades the only remaining large area on the Alaskan
8 Arctic Coast where human activities are not already
9 pronounced or where land use commitments have not
10 already been made which will increase activity.

11 It should be possible if no
12 pipeline system is built across the Arctic National
13 Wildlife Range to establish an ecological reserve
14 system for the Arctic that will provide areas for
15 future studies and serve as an ecologic base from
16 which to monitor changes brought about by future
17 developments elsewhere in Alaska.

18 Construction, operation and
19 maintenance of the proposed natural gas pipeline and
20 subsequent industrial development within the Arctic Na-
21 tional Wildlife Range, would greatly reduce the value
22 of that area for inclusion in a research natural
23 area system since much of the development would
24 substantially modify existing natural conditions.

25 Q I wonder then, with
26 these considerations in mind, if we could proceed
27 with the consideration from your perspective
28 of the ecological features of the various routes,
29 perhaps starting with the prime route proposed by
30 Alaska Arctic Gas.

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W. Parker
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1 A For approximately the
2 first third of the route, to the Canning River,
3 the pipeline would cross fairly flat, treeless,
4 arctic coastal lake and pond-dotted plains. This is
5 typical wet tundra of the Arctic Coastal Plain
6 province which is described in some detail in the
7 Arctic Regional Profile on pages 14 - 123 and
8 in the Resources of Alaska volume, both of which I
9 tabled previously.

10 The west bank of the Canning
11 River is the western boudary of the Arctic National
12 Wildlife Range. From this point the proposed route
13 climbs to an elevation of approximately 400 to 500
14 feet and continues easterly through gently rolling
15 foothill country to the Canadian border at milepoint
16 195. The vegetative characteristics of this moist
17 tundra region, typically of the Arctic Foothills pro-
18 vince are also described in the Arctic Regional
19 Profile and in resources of Alaska Regional Summary.

20 As the route traverses these
21 regions collectively known as the North Slope, it
22 intersects all of the rivers and streams between
23 Prudhoe Bay and the Canadian border. These surface
24 drainage systems and the less well-defined drainages
25 play an important role in Arctic tundra ecology
26 due to the dry climate of the area and due to the
27 persistent permafrost which inhibits subsurface
28 drainage.

29 Permafrost is continuous along
30 this route, although an active layer of surface ground

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W. Parker
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1 which thaws during the summer months is an important
2 feature. This active layer may be any where from
3 one half of a foot to five feet in depth.

4 Areas without permafrost
5 or areas where it has been deeply thawed are found
6 under or near bodies of water. Therefore, because
7 of the changing conditions along the route, the
8 pipeline will pass from zones of solid permafrost
9 to permafrost free areas innumerable times.

10 Natural disturbances to
11 permafrost such as lake drainage, fire and solifluction
12 upset the delicate heat balance. Human activities
13 that disrupt vegetation include vehicular traffic,
14 the placement of structures and excavation. The
15 thickness and general insulating qualities of the
16 organic layer and the ice content of the uppermost
17 layers of permafrost are probably most critical in
18 determining specific impacts.

19 All disturbances in permafrost
20 areas will have long term effects on permafrost
21 regime. Short term effects result during such major
22 activities as construction when the surface layer
23 is pulverized or removed and ice rich soil is exposed
24 to direct radiation of the sun and/or new sources
25 of water. Modification of the heat balance almost
26 always causes degradation of the permafrost layer.
27 If a high ice content area is involved, subsidence,
28 slumping, gullyng and the establishment of new
29 drainage patterns may occur. Once initiated, perma-
30 frost degradation is difficult to arrest until a new

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1 heat balance is achieved. Disturbances from the
2 Brooks Range north will be slow to revegetate naturally
3 because of the short growing season. South of the
4 Brooks Range the growing season is longer and dis-
5 turbances will revegetate somewhat more quickly.
6 Continuing erosion also adversely affects natural
7 revegetation.

8 Two conditions cause permafrost
9 to melt, thermal erosion and thermal melting. Thermal
10 erosion is a term used when permafrost is placed in
11 contact with flowing water, thus at the shoreline
12 of the Arctic Ocean where the warm water strikes
13 against the ice lenses on shore, thermal erosion
14 will take place. Thermal melting results when
15 permafrost ice is exposed to solar radiation.

16 In the lowland area north of
17 the Brooks Range, the temperature of permafrost at
18 depths just below the zone of seasonal variation,
19 generally ranges from about 12 degrees to about
20 23 degrees Fahrenheit, and in the lowland area
21 south of the Brooks Range, the permafrost temperature
22 generally is warmer, about 23 degrees -- or
23 warmer than about 23 degrees Fahrenheit.

24 Within mountainous areas, for example, the Brooks
25 Range itself and the Yukon-Tanana Uplands between
26 the Yukon River and the Tanana River, the temperature
27 of permafrost is extremely variable.

28 Indications are that the
29 temperature of the gas will be changed during the
30 first four years of operation with temperatures colder

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W. Parker

In Chief

1 in winter than in summer. Depending on the depth of
2 burial of the pipe and the temperature of the gas
3 and the temperature of the adjacent permafrost, the
4 depth of the active layer will be reduced. The
5 anticipated change in the depth of the active
6 layer over the pipeline will be as much as 1½ feet
7 with a gas temperature of about 12 degrees Fahrenheit.

8 Since the ultimate operating
9 temperature of the proposed pipeline has not been
10 specified, the long range heat balance between the
11 surface temperature, the size of the frostbulb and
12 adjacent soil cannot be estimated. Accordingly
13 the depth of the active layer is now very speculative.

14 The "Prime" route generally par-
15 allels the Beaufort Sea coast, a unique geologic
16 feature which on a seasonal basis supports large
17 numbers of birds and marine mammals as well as fish.
18 Unique and productive inshore lagoons are extremely
19 important for migrating and nesting birds as well
20 as food chain production based on an early algae bloom
21 on the subsurfaces of ice. Very active erosional
22 forces have been noted in places causing coastal
23 retreat of 10 meters per year. The movements of
24 birds as well as longshore circulation patterns
25 interrelate with all aspects of this ecological
26 system.

27 Another significant ecological
28 feature of this prime route corridor is the presence
29 of the Porcupine Caribou herd on the calving grounds
30 of the coastal plain and foothills during the summer.

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1 In addition, several areas, generally at or within
2 25 miles of the coast have been found recently to
3 be preferred sites for polar bear dens. The signifi-
4 cance of this discovery is that polar bears are
5 known to be extremely sensitive to disturbance while
6 denning. Development activity near den sites would
7 drive polar bears to offshore areas with resultant
8 lower reproductive success.

9 Q Dr. Weedon, what do you
10 consider to be the critical environmental considerations
11 of this prime route that you described?

12 A The environmental concerns
13 for the prime route will vary considerably depending
14 on whether or not the route can be constructed in a
15 single winter season as the proposal intends. I
16 understand that this is a highly speculative matter,
17 however, my comments will be based on the assumption
18 that the route will be constructed on schedule, that
19 is, within a single winter season, within the
20 Alaskan area.

21 Problems with water availability,
22 gravel availability and mining impacts, disturbances
23 to birds, mammals and fish and impacts of stream
24 crossings will be especially critical for this
25 route. The primary environmental concern is with
26 the relationship of the route to the Arctic National
27 Wildlife Range and I will expand on this issue in
28 a moment.

29 Arctic Gas has indicated a
30 general need for as much as 187 million gallons of

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W. Parker
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1 water during the winter construction season when pipe-
2 line is placed in the ground. Alaskan Arctic Gas
3 Pipeline Company has not conducted specific studies
4 that I am aware of, on where this amount of water would
5 be obtained, as, and I should -- well, I will go on.
6 General information indicates that no more than
7 one half of the total requirement is available and
8 no water is available after December except at springs
9 or at the few larger lakes which do not freeze
10 completely to their bottoms. Except for the first
11 40 to 50 miles of the proposed route, there is not
12 an abundance of lakes associated with construction
13 areas. In the segment used by Arctic Gas to indicate
14 water needs, that is in milepost areas 65 to 130,
15 there are no larger lakes at all except at the two
16 ends of this 65 mile segment.

17 As winter progresses, the
18 available unfrozen water tends to have increasing
19 amounts of minerals and salts due to the freezing
20 of water. Accordingly by late winter unfrozen
21 water supplies may have excess amounts of salts. Ground
22 water within or beneath permafrost has concentrated
23 amounts of dissolved solids.

24 The protection of fish stocks
25 in Arctic streams will thus be of major concern. If
26 any of the 187 million gallons of water required by
27 the applicant was to be withdrawn from sites occupied
28 by overwintering fish, such a withdrawal would pro-
29 bably result in the death of those fish and very
30 possibly the loss of the populations using that site.

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W. Parker
In Chief

1 The effects of dewatering areas will be aggravated
2 by siltation and erosion caused by construction
3 activities.

4 I'd like to digress for a
5 moment and simply say that some arctic fish that
6 spend the summer in fresh water, spend the winter
7 in the brackish water near shore. Some of those
8 fish, however, also spend the winter in the deeper
9 holes, in the deeper lakes in the very rare rivers,
10 and lakes which have deep fresh water, unfrozen water
11 in the winter time and it is those latter populations
12 of fish, the fish depending on overwintering in the
13 scarce deep water areas on shore that we are most
14 apprehensive about in connection with this use
15 of scarce arctic water supplies.

16 Increased access to a caribou
17 herd and increased human activity have historically
18 had adverse impacts on caribou and reindeer herds
19 wherever they are found. There is no reason to
20 expect the activities associated with the proposed
21 Alaskan Arctic Gas Pipeline Project will have any
22 less impact. The caribou is essentially a wilderness
23 animal that depends largely on climax vegetation for
24 its food and that requires very large, undisturbed
25 areas for its seasonal movements. It is also a
26 herd animal adapted to almost constant movement
27 during the year, movements which prevent the overuse
28 of available forage and which usually bring the
29 caribou back to a traditional calving ground.

30 In the summer, disturbance

1 by aircraft will be most critical during the calving
2 period of late May and early June. Harassment by
3 low flying aircraft at that time may interfere with
4 the normal interaction of the cow and calf and
5 cause the pair to move before the calf is dry, or
6 has nursed properly. In the extreme case, cows
7 will abandon calves which then will have little
8 chance of survival.

9 Disruptions of the normal
10 movement and behaviour patterns of the Porcupine
11 Caribou herd may cause the herd to abandon part or
12 all of the traditional calving ground with possible
13 catastrophic effects on the population and serious
14 secondary impacts on the wolves and humans who
15 depend on caribou for their subsistence. While
16 the animals in a caribou herd may move great distances
17 by slightly different routes each year, and the
18 herd may winter in unpredictable locations within
19 the traditional range, they traditionally return
20 to the same calving ground each spring. If the
21 proposed pipeline facility should cause the Porcupine
22 herd to abandon its calving area north of the proposed
23 pipeline, the population may not be successful in
24 calving elsewhere and in maintaining its present
25 numbers. The long term possibility that a major
26 international resource could be lost as a result of
27 gas pipeline activities cannot be ignored, and I
28 may say, is definitely not being ignored by this
29 Inquiry, or by the applicant for the proposed line.

30 Polar bears would be primarily

1 affected by the wharf and airfield activities at
2 Camden and Demarcation Bays. That's within the
3 Alaskan area.

4 Because of polar bears'
5 extreme sensitivity to disturbance, any human
6 activities in the vicinity of polar bear dens would
7 lead to lower reproduction success. Several dens
8 have been located in recent past winters in the
9 Camden and Demarcation Bay areas.

10 Although thresholds are generally
11 unknown for Arctic animals, the capacity of many
12 wilderness wildlife species to absorb and adjust
13 to the increased disturbance diminishes with each
14 additional disturbance and a general reduction in
15 wildlife population numbers and species diversity
16 can be expected as a result of increased development.
17 The eventual disappearance of wilderness dependent
18 and rare species will follow human occupation of
19 the pipeline route.

20 Normal animal behaviour patterns
21 would be disrupted due to noise sources from construc-
22 tion activities along the route. This disturbance
23 could conceivably result in some degree of physiologi-
24 cal stress and will probably at least force animals
25 from the specified areas activity. Some noise
26 effects will be confined to the construction phase.
27 Operation and maintenance noise impacts will continue
28 in areas adjacent to compressor stations, airfields,
29 material storage sites and repair sites. Explosives
30 will be used to excavate as much as 25% of the trench

1 of the proposed pipeline.

2 About 3 million cubic yards of
3 gravel and sand will be required along the prime
4 route in Alaska. This will largely be taken from
5 river floodplains although sources have not been
6 identified positively. Many borrow pits will be
7 within the calving range of the Porcupine herd,
8 although mining activity can be halted during
9 calving. At present it is anticipated that unused
10 ice rich spoil from the ditch will be replaced at
11 the borrow sites, although the effects of this
12 deposition have not been evaluated, in other
13 words you would be taking gravel from borrow pits
14 and disposing of in some other location, the ice
15 rich and generally mucky soils from the ditch
16 itself.

17 The federally administered
18 Arctic National Wildlife Range, the largest unit in
19 the National Wildlife Refuge System, is located
20 in the northeast corner of Alaska. It extends 150
21 miles north and south across the Brooks Range and
22 west from the U.S.-Canadian border about 133
23 miles, to the west bank of the Canning River. The
24 Range encompasses approximately 14,000 square
25 miles. Established in 1960, the range is intended
26 to preserve, and I quote, "...unique wildlife,
27 wilderness, and recreational values...." end quote,
28 and that quotation is from Public Land Order 2214
29 which was referred to by Mr. Marshall in cross-
30 examination yesterday. Approximately 30% of the

R.B. Weedon
W. Parker
In Chief

existing range is located on the Arctic Coastal Plain and Arctic Foothills. Here is found the nation's last remaining untouched Arctic coastal wilderness. This part of the range is a diverse wilderness habitat of coastal lagoons, barrier beaches, treeless tundra and thaw lakes bordered on the north by the Beaufort Sea and on the south by the Brooks Range.

The Arctic National Wildlife Range supports many species of wildlife, birds and fish. It is the primary calving ground of the Porcupine Caribou herd whose population is estimated to be between 93,000 and 115,000 animals. The area is inhabited by grizzly bears, polar bears, wolves, wolverine, Dall sheep and muskoxen. Thousands of shore birds and water fowl nest in the wet lands and river valleys. Arctic char and grayling are common in the rivers and streams. In almost all cases, the Arctic coast provides habitat critical to the well being of these animals.

The Arctic National Wildlife Range offers the only remaining opportunity in Alaska to maintain a continuum of undisturbed Arctic ecosystems within the provinces that include the Arctic Coastal Plain, the Arctic Foothills, the Brooks Range and the Porcupine Plateau. All of these are encountered within 150 miles from north to south, an unusually short distance for such a wide range of ecosystems.

The proposed Alaskan Arctic Gas

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Pipeline System with its individual components will have a cumulative long range adverse impact on possible future status and productivity of the Arctic Coastal Plain and Foothills areas of the Arctic National Wildlife Range as wilderness. Presence of the pipeline system will not only introduce machinery and noise, but also people. The presence of more people will have a long term detrimental effect on resources which are scarcer each year -- solitude and quiet. The proposed Alaskan Arctic Gas Pipeline System will also provide the catalyst for intensive prospecting of the Beaufort Sea offshore oil and gas province and the Marsh Creek anticline. These will separately and cumulatively alter the existing de facto wilderness character of the area to the extent that it would not qualify for inclusion in the National Wilderness Preservation system. The impact of the proposed project is therefore adverse and major on wilderness character. It is expected that the zone of lowered wilderness character will extend southward to the northern flanks of the Brooks Range, thereby removing entirely the wilderness continuum from the Beaufort Sea through the Brooks Range.

Major storage areas for fuels, lubricants, methanol, and other toxic fluids are proposed at the three port sites, four future compressor station sites, and the Prudhoe field office area. A large number of ships, barges and related shallow-draft watercraft will be used to transport equipment as well as fuels, lubricants and toxic fluids.

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W. Parker
In Chief

1 The probability for major spills
2 of fluids, lubricants or toxic materials at storage
3 sites and water transportation along the Alaskan
4 Arctic coast cannot be discounted. Should a major
5 spill occur there would be long term adverse impacts
6 on water quality. Because adverse weather and ice
7 conditions can hamper remedial actions it is probable
8 that adverse water quality conditions would be
9 serious. The extent of lowered water quality in
10 the marine estuarine ecosystem along the Alaskan
11 Beaufort Sea coast would depend on the following:
12 (1) the type of fuel or material spilled; (2) the
13 amount spilled; (3) the season; (4) the location;
14 and (5) the success of remedial action. Under worst
15 case conditions it would be possible to harm up
16 to 60,000 oldsquaws and eider ducks.

17 Repeated small spills of
18 fuels and lubricants may be as serious as a water
19 quality problem as a single large spill would be.
20 Spills have potentially greater impact at the
21 three port sites and during water transportation
22 since control measures would be difficult. Petroleum
23 products entering the subsurface drainage system
24 may lower freezing temperatures of ground water and
25 delay the formation of a frost bulb and threaten
26 pipeline integrity.

27 Q I wonder, Dr. Weedon,
28 if you would now go on to consideration of the
29 ecological features of the interior route.

30 A The interior route traverses

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W. Parker
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1 a considerable variety of Alaskan environments from
2 the Arctic Plain north of the Brooks Range , through
3 the foothills and mountains and across the Porcupine
4 Plateau to the Canadian border. Many of the
5 significant features of the tundra and foothills
6 have been discussed as they pertain to other
7 route alternatives and a more detailed description
8 of these environments is available in both the
9 Arctic Regional Profile and in the volume, Resources
10 of Alaska Regional Summary, chapters 2 and 3.

11 One main feature of this
12 route concerns the Marsh Fork of the Canning River
13 which is one option for crossing the Continental
14 Divide, and as you understand, Mr. Commissioner,
15 the interior route has a short split in which there
16 are two options possible, one of which is to use
17 the Marsh Fork of the Canning River. This particular
18 option is an extremely diverse and rich and productive
19 area with significant value as wildlife habitat. The
20 Joint Federal State Land Use Planning Commission
21 for Alaska recommended that the Marsh Fork of the
22 Canning River be, and I quote, "closed to all develop-
23 ment uses including mining and oil and gas production
24 and other uses which would alter the existing ecology"
25 end quote, because of its high wildlife values and
26 potential as a scientific study area. However, the
27 other route option up the Canning River directly
28 traverses areas which also are extremely valuable
29 as grizzly bear and moose habitat. These are im-
important wilderness areas. In many cases along the

R.B. Weedon
W. Parker
In Chief

1 route, valleys tend to be quite narrow, so there
2 would be little hope that resident wildlife populations
3 might avoid construction and maintenance activities.

4 I might comment in slight digression that river
5 valleys in the north tend to be extremely important
6 because it is there and in a very narrow strip along
7 river valleys, that vegetation tends to grow higher
8 where trees may occur and where tall shrubs occur
9 and it is those areas where food is available
10 above the snow to animals that spend the winter there
11 and cannot dig through the snow to get food closer
12 to the ground. So these narrow river valleys constrict
13 wintering wildlife of various kinds and are hence
14 very critical areas.

15 Compressor stations in the
16 mountainous areas would be particularly damaging
17 especially as these stations would require substantial
18 ancillary facilities in the form of airfields,
19 communication towers, etc. It appears that a
20 compression station would be located in the
21 Marsh Fork valley. I mention this here because
22 these important features of the route are especially
23 significant in relation to the developmental activities
24 which may affect them.

25 The route crosses the Continental
26 Divide at about 5,000 feet in elevation or an altitude
27 over extremely rugged terrain. This is across
28 high alpine tundra which is also described in detail
29 in the Arctic Regional Profile and the book,
30 Resources of Alaska, and is illustrated in a joint

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Commission's map of major ecosystems of Alaska.

Valleys south of the Brooks Range along the Interior Route are generally broad and flat. The topography is basically low ridges, and shallow valleys with numerous pothole lakes in the flatter segments. Permafrost along this area, as along the rest of the route is considered to be continuous, although it lies in a general transition zone between continuous and discontinuous or patchy permafrost. This area eastward to the Canadian border is also the transition zone between the Brooks Range and the Porcupine Plateau physiographic provinces.

Terrain features on the eastward portion of the route are not dramatic although several rivers are crossed, most notably the Sheenjek and Coleen Rivers. These rivers eventually empty into the Porcupine River south of the proposed route. The Sheenjek has been proposed as a National Scenic River as has the Porcupine River. Portions of the route also separate the existing Arctic National Wildlife Range from areas to the west and south which have been proposed for inclusion in the National Wildlife Refuge System. The entire route traverses true wilderness with a tremendous variety of prime wildlife habitat and generally healthy populations of these wildlife species.

Q What do you consider to be the critical environmental concerns of the interior route alternate?

Additional potential impacts to resident wildlife populations have been stated in testimony of Dr. Banfield at the recent federal

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1 Power COMmission gas pipeline hearings in Washington,
2 D.C. Dr. Banfield describes the problem along
3 the interior route, of, and I quote, being "faced
4 with open ditch which might be a few miles long and
5 several feet wide with a thousand or so caribou
6 approaching the area. This ditch and the pipe
7 associated with it would be an impediment to their
8 normal migration routes."

9 He goes on to say that,
10 "The Canning River area in Alaska is an important
11 wildlife area for mammals and birds including a number
12 of raptors and other rare or endangered species. The
13 construction along the Canning River would have to
14 be undertaken during the summer. I felt that the
15 summer construction up this valley full of birds and
16 migrating animals would be a serious impact."

17 It can be expected that Dall sheep
18 would be seriously affected by the construction and
19 maintenance activities along the Interior Route. These
20 concerns are indicated in the Alaskan Arctic Gas
21 Pipeline Company environmental report and I will
22 summarize them briefly.

23 First, about 50% of the Dall
24 sheep population within the Canning River drainage
25 winter adjacent to the Interior Routes.

26 Number two, several Dall
27 sheep lambing areas are similarly close to this
28 Interior Route.

29 Third, the route traverses
30 several important sheep trails within the Canning

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1 River drainage.

2 And fourth, the compressor
3 station along the Marsh Fork is located in an area
4 intensively utilized by sheep during all seasons of
5 the year and is also in close proximity to three
6 important mineral licks used by sheep.

7 Land use considerations are
8 fundamental to any alternate routes. The Interior
9 Route is significant in its proximity to the existing
10 Arctic National Wildlife Range and its potential
11 for conflicting with future management options for
12 the area.

13 The Interior Route Pipeline
14 System alternative would transect a largely
15 undisturbed continuum of arctic ecosystems and
16 vegetation types from the Arctic Ocean south to the
17 interior of Alaska. We are at a time in the develop-
18 ment of Alaska's arctic resources when much of the
19 area is still relatively unaffected by human acti-
20 vities. It is an ideal time to identify and estab-
21 lish a series of research natural areas in Alaska
22 and it is still possible to select those areas which
23 appear to have the most potential value. This is in
24 marked contrast to situations elsewhere, in which
25 research natural areas are selected from the
26 remnants left after many years of development and
27 human disturbance.

28 If no pipeline is built east
29 of the Canning River, it should still be possible to
30 establish an ecological reserve system for the Arctic

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1 that would provide areas for future studies and serve
2 as an ecological base from which to monitor changes
3 brought about by future developments in Alaska.

4 Q Would you now go on to
5 describe the major ecological features of the
6 Fort Yukon Route?

7 A The Fort Yukon Corridor
8 is the same as the Fairbanks Corridor which I will
9 describe later for the first 110 miles south of
10 Prudhoe Bay. It follows the established Alyeska
11 pipeline route across the Arctic Plains into the
12 Brooks Range. The details of tundra ecology and the
13 fragile nature of this tundra ecosystem have been
14 well documented and I refer you to several documents
15 I have tabled for a more complete description.

16 The Fort Yukon Corridor crosses
17 the Brooks range at an elevation of about 4,900
18 feet to the east of the Fairbanks Corridor as the
19 braided Ribdon River. It then joins the Wind River
20 Valley. The high alpine tundra regions of the
21 Brooks Range are illustrated on the ecosystems map
22 which I have tabled and are described on page 14 of
23 the Arctic Regional Profile and page 90 of the Resources
24 of Alaska which I have tabled. These mountains
25 range from 6,500 to 7,500 feet in elevation and can
26 be very steep and jagged. Although precipitation is
27 higher than along the coast runoff is correspondingly
28 high and I might add that frequently percolation is
29 higher as well due to the deposition of gravels and
30 talus slopes due to the slope of these mountains

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1 and due to the continuous permafrost.

2 The majority of the remaining
3 portions of the route in Alaska traverse areas of
4 very poorly drained terrain with numerous lakes and
5 ponds, abandoned river channels and marshes. This is
6 typical of the Yukon Flats which provide very ex-
7 tensive areas of waterfowl habitat. The entire
8 upper Yukon Region lies within the discontinuous
9 permafrost zone, that is, the zone of patchy perma-
10 frost. Several forest types are traversed south of
11 the Brooks Range, among them the Bottom Land Spruce-
12 Poplar Forest of the river terraces, and Upland
13 and Lowland Spruce-Hardwood forest which occur
14 intermittently along higher plateaus and along the
15 Yukon Flats, respectively. Again, I refer you to the
16 maps, the map of the Major Ecosystems of Alaska.

17 In all, the route traverses
18 seven distinct physiographic provinces ranging from
19 the Arctic Coastal Plain through the foothills and
20 across the Brooks Range, down again to the Porcupine
21 Plateau and Yukon Flats. This broad range of terrain,
22 vegetation and habitat type is the most significant
23 general feature of the Fort Yukon Route. Wildlife
24 populations of course are a major feature of any
25 route through Alaska's wilderness and this is no
26 exception. The Arctic Profile and Resources of
27 Alaska volume provide the exhaustive lists of
28 birds, fish and mammals present in those areas. I
29 might simply mention that the range for moose,
30 caribou, grizzly bear, sheep and black bear which

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1 is found along this corridor is among the best in
2 the state. The Yukon Flats, as I mentioned are well
3 known for their importance to breeding waterfowl.
4 It has been estimated that the half million or so
5 breeding ducks on the Yukon Flats represent almost
6 2% of the total continental breeding population of
7 waterfowl. The trumpeter swans which often nest
8 here and the peregrine falcons which are known
9 to exist along the Yukon River near the Canadian
10 border, represent vital stocks of rare species.
11 In the case of the peregrine population, it appears
12 that they are still suffering a decline and I might
13 add that the decline may be a result of the birds
14 picking up poisons, DDT and others in their southern
15 wintering areas, it may also be due to increasing
16 disturbance in the north, both from falconers and
17 from various other people.

18 Q Dr. Weedon, what are
19 the critical environmental considerations which you
20 feel apply to this Fort Yukon alternative?

21 A The Fort Yukon Corridor
22 traverses a considerable variety of landscapes and
23 environments and this introduces a broad range of
24 environmental concerns. There will be apparently
25 two winter construction seasons required within
26 Alaska to build this route which then prolongs the
27 immediate and inevitable environmental impacts.
28 The critical environmental considerations which apply
29 to the route are therefore primarily a function of
30 the duration of construction activities and the many

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1 extremes of climate and physiography with which the
2 proposed gas pipeline must interact. The problems
3 mentioned earlier with slope stability, permafrost
4 degradation and alteration of drainage may be particu-
5 larly severe along the Fort Yukon Corridor. The
6 location and impacts of mining gravels along this
7 route are a concern as are the inevitable disturbances
8 to wilderness dependent animals. Additionally the
9 route traverses several areas which have been
10 recommended for special management and inclusion
11 into national conservation systems.

12 Counsel, I can continue to read
13 this report which goes into some detail on each of
14 those features, that is, slope stability, permafrost
15 degradation, alteration of drainage and so on. I
16 will do so. I will on the other hand defer to your
17 advice on whether it is sufficient to simply table
18 that with my testimony. As you wish.

19 Q Well, I am in the hands
20 of the Commissioner, but I think that this is an
21 exhibit and can be for more detailed reference.
22 Perhaps you can merely refer to any particular
23 items that are different from what you say at another
24 time. Otherwise this can just be filed as a reference.

25 THE COMMISSIONER: Well,
26 'certainly we intend to review it closely later on in
27 any event. If you were to pause at this point,
28 Dr. Weedon, I notice you go on from there to a consid-
29 eration of the offshore route and then to a considera-
30 tion of the Fairbanks Route. I think that it might be

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appropriate to follow the procedure that Dr. Weedon has suggested. In view of the evidence that I have heard here this week, I think that it would be important though that when you reach the Fairbanks Route you deal with that in toto, so to speak.

A Yes.

I am not familiar either with what has gone on before in detail in this Inquiry nor the procedures for an inquiry of this sort in any case, and so I defer to your judgment. I don't want to bore the Commissioner or any members here with repetitious material and that was the reason for bringing it up.

THE COMMISSIONER: Well, you weren't boring me and I think we all found it fascinating. I'd be just as happy if you carried right on. This is very, very helpful to us all.

A I'd be happy to. I will continue then, Mr. Commissioner.

Slope instability resulting from the disruption of permafrost thermal balances and thermal erosion will be a critical concern along this route which is now the Fort Yukon route, particularly along steep mountain slopes. Landslides, deep seated creeping, soil creeping and mass wasting and surface or skin flows are all phenomena related to slope disturbances and permafrost degradation which can seriously threaten pipeline integrity, and again, to translate for both myself and for other people, what this means is that if you disturb a slope which

1 has been held in place because it has been frozen,
2 you disturb it and it thaws out, then that will
3 cause the slope materials up slope to move at a
4 more rapid than normal rate downslope. It will pile
5 up materials against the pipeline or any other type
6 of barrier and the question will be, can that
7 barrier withstand the stresses of that piled up
8 material.

9 Repair of the pipeline as
10 well as routine maintenance and revegetation activi-
11 ties will have to proceed during the summer because
12 of the fact that much of this creeping and down
13 slope movement occurs in the summer and will intro-
14 duce the potential for further slope disturbances
15 and impacts on wildlife species.

16 Discontinuous permafrost presents
17 additional hazards to pipeline integrity, as its
18 occurrence, moisture content, and temperature are
19 unpredictable. The chilled pipeline will interact
20 of soils of varying composition and the effects on
21 each type of soil will be different. Portions of the
22 route are thought to cross through silts with ground
23 ice to great depths. These soils will be especially
24 subject to liquifaction, thaw and collapse, following
25 disturbances to tundra vegetation. Again, in partial
26 translation, the more ice there is in the ground that
27 is disturbed and exposed to thawing, the more the
28 ground will slump and collapse following this dis-
29 turbance.

Surface drainage systems along

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1 the Yukon Flats are are primarily responsible for
2 the prime waterfowl habitat of the area. The
3 creation of a frost barrier to surface and interstitial
4 that is, within gravel or within soil waterflow, and
5 the consolidation of smaller drainage systems into
6 larger flows, will alter this important ecological
7 balance and create new marsh and new dry land
8 areas. The overall impact of this change on waterfowl
9 populations is speculative, it is not likely to be
10 beneficial to say the least.

11 The Fort Yukon route has not
12 been adequately studied in relation to gravel
13 availability and it appears that areas south of the
14 Brooks Range may not afford readily accessible
15 deposits. Along the Yukon Flats, very limited inform-
16 ation suggests that sandy gravel lies near the
17 surface in some areas, but is mantled or covered
18 by turf and peat several feet thick. The areas of
19 relatively shallow gravel are laced with filled
20 channels in which -- that is, filled old river
21 channels -- in which ice rich peat and silt reach
22 thicknesses of many tens of feet. Drainage is poor
23 and the water table is near the surface. These con-
24 ditions all represent problems which could be in-
25 vestigated in greater detail particularly as they
26 relate to the possible destruction of important
27 wildlife habitat.

28 On all locations along this
29 Fort Yukon route, gas pipeline construction and opera-
30 tion would have significant land use consequences.

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Lands are primarily now in an undisturbed or wilderness condition and are "used" largely for the production of wildlife species which depend on extensive areas free from disturbance by man for their well being. This wildlife in turn provides the base for a subsistence hunting and trapping economy and lifestyle unique to rural Alaska and rural northern Canada.

As long as state, federal and local land use plans are not established, the construction, operation and repair of the Fort Yukon alternative will cause a premature commitment of land uses. The route crosses several areas recommended for special management and inclusion into national conservation systems, including the following five, and incidentally the recommendations I am speaking of are those recommendations made by the Secretary of Interior to Congress pursuant to the Alaskan Native Claims Settlement Act. These five recommendations are: for a southwest extension of the Arctic National Wildlife Range, which Mr. Collins and others formerly explained; number two, the Wind National Wild River area; number three, the Yukon Flats National Wildlife Refuge; number four, the Porcupine National Forest; and number five, the Yukon - Charley National River areas.

These areas have all been suggested for study to determine if they should be included in the National Wilderness Preservation system. I refer you to the land status map which illustrates the

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1 present status of Alaska's lands.

2 MR. ANTHONY: Mr. Commissioner,
3 we propose now to go onto a consideration of the
4 offshore route, would you like us to proceed?

5 THE COMMISSIONER: Yes.

6 A The main feature of this
7 offshore route is obviously that it is located
8 principally on the bed of the Beaufort Sea and at
9 water depths of 20 to 20 feet. Ecological features
10 associated with the offshore route are unique to
11 the Arctic Coastal Zone. Marine mammals, birds,
12 fish and lower trophic levels exist in an association
13 which is complex and only beginning to be under-
14 stood. This association is closely linked to the
15 harsh physical realities and dynamic processes which
16 characterize the arctic environment.

17 Arctic marine ecosystems have
18 been variously described in terms of their stability,
19 diversity and nitch saturation. The most widely
20 accepted thesis is that polar ecosystems represent
21 youthful development and are consequently lower in
22 diversity than warmer environments. Northern systems
23 are generally characterized by seasonal productivity,
24 that is, high seasonal variation in productivity, and
25 in food availability, slow growth, the numerical
26 dominance by a few species of animals and plants and
27 relatively simple food webs. Such systems are
28 regulated primarily by oscillations, temporal
29 oscillations in the physical environment, whereas
30 biological interactions like competition and predation

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1 are considered more significant in the maintenance
2 of so-called niche-saturated temperate and tropical
3 ecosystems. Again in translation --

4 THE COMMISSIONER: Temperate.

5 A Pardon?

6 THE COMMISSIONER: Just temperate.
7 Niche-saturated temperate --

8 A Temperate, temperate and
9 tropical ecosystems. Biologists conceive of any
10 given piece of geography as containing a number
11 of opportunities for, if you will, lifestyles,
12 for different animals, the lifestyle of a mosquito,
13 let's say, and of the caribou and of a mouse. In
14 tropical areas and in temperate areas there are many,
15 many such niches available because there are, for
16 example, just taking a vertical section from the
17 ground upward, the existence of a forest creates
18 niches for arboreal species squirrels, monkeys,
19 etc., that simply aren't possible in an area without
20 a forest and that is a very obvious statement which
21 we translate, as scientists want to do, into
22 something as obscure as this term "niche saturation".

23 In many cases ice is the
24 dominant environmental feature of the near shore
25 region. The annual process of freeze and break up
26 is important -- are important influences on coastal
27 morphology and on the lives of resident and migratory
birds, mammals and fish.

28 Circulation features, the in-
fluence of the seasonal ice pack and arctic rivers

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1 have created unique near shore lagoonal ecosystems
2 along the coast. A wide variety of birds, fish and
3 mammals depend on the lagoons and the particular
4 salt and fresh water balance which is established
5 within them. Seabirds are important links between
6 terrestrial and marine ecosystems, especially during
7 breeding season when food requirements are high.
8 At the ice edges there often occurs a diverse and
9 productive assemblage of organisms from phytoplankton,
10 tiny one celled plants, up through the marine
11 mammals.

12 Slow growth rates and the
13 long period of freeze up tend to make arctic eco-
14 systems particularly sensitive to disturbance. This
15 is especially important in the marine environment
16 where circulation features and the movements of
17 migratory wildlife may tend to enlarge an area of
18 impact beyond its immediate source.

19 Q Can you tell us what you
20 feel are the critical environmental considerations
21 of this offshore route?

22 A These considerations fall
23 into two categories: hazards to offshore operations,
24 and disruptions of nearshore ecosystems.

25 The marine segment of the off-
26 shore alternate route would contain significant
27 engineering problems not encountered with a land
28 pipeline system. For example, the depth of burial
29 in the sea floor will need to be below expected
30 ice gouge depths. Thus, excavation of the sea bed

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ditch probably would be in excess of 20 feet.

Pipeline design would need to consider external pressures caused by large grounded ice masses and measures needed to maintain the negative bouyancy, the sinking tendency of the pipe while combating potential frost heave from the seabed permafrost, and I am sure that it has been entered into the record before, but I'll merely emphasize a fact that was intriguing to me when I learned it several years ago, that there is permafrost frequently encountered under the ocean, regardless of the fact that the temperature of the ocean water is, at least at the surface, normally above freezing and below the surface, only barely, slightly -- barely below the freezing temperature, 32 degrees Fahrenheit .

One conclusion of the state of Alaska's "Environmental Assessment of Beaufort Sea Nearshore Petroleum Leasing" was that ice hazards, even within lagoons, will be a problem affecting the integrity of any pipelines from offshore structures.

Permafrost in the bed of the Beaufort Sea creates special unsolved problems which can adversely affect pipeline integrity. Pipeline foundation problems are expected since excavation of the ditch up to 20 feet into bottom sediments, introduction of water warmer than the adjacent bottom sediments and subsequent operation of the chilled pipeline will alter thermal conditions. It is possible that ice will form under the pipe in a manner similar to that under pipe on land forcing

the pipe upward. Should this occur the pipeline integrity would be adversely threatened by ice gouging.

Significant thermal problems will be associated with the transition of a gas pipeline from permafrost conditions under the Beaufort Sea to on land permafrost. Operating temperatures are assumed to be the same for on land segments of the offshore alternative as those proposed for the prime route. Therefore, gas will be received at a temperature of 25 degrees Fahrenheit. Temperatures of seabed permafrost are unknown but it is assumed that they are nearer 32 degrees Fahrenheit than the on land or terrestrial permafrost because of the moderating effect of the marine environment. It can, therefore, be expected that the temperature of the gas will be warmer than the on land permafrost after passage of that gas under the ocean floor, before it reaches the first operational compressor station in Canada. This enhances the probability of frost heave as the pipe carrying this slightly warmer gas will be warmer than the permafrost encountered on shore and thereby cause water to migrate toward the pipe where it then turns to ice. Frost heave threatens pipeline integrity and increases the need for repair. The interaction of two potentially different types of permafrost with a chilled, buried pipeline is considered a significant unsolved problem that will cause adverse impacts on pipeline safety or integrity.

In its assessment of leasing for development of oil and gas on nearshore state owned lands in the Beaufort Sea near Prudhoe Bay, the State of Alaska concluded that the presence of permafrost, and I quote:

"...presents a hazard both to pipeline systems which may have to be buried due to ice gouging problems and to offshore drilling structures due to brine migration and thaw 'freeze back' and possible wellhead subsidence."

These same problems apply to an offshore gas pipeline and related facilities such as valve structures.

Erosion of coastal areas, including barrier islands, associated with the four crossings of marine segments of the Offshore alternative route, will be affected by construction, operation and repair of an offshore pipeline system. The coastal tundra bluffs are presently actively retreating, slumping and eroding due to thermal and wave erosion. With a predicted coastal retreat of 10 meters per year and a pipeline life of 20 years, the pipe would have to be buried beneath the active layer starting 200 meters inland from the present coastline to avoid adverse impacts on the pipeline system created by the retreating coastline that would initiate pipeline failure. In other words, unless you want to risk having your pipeline dangling over the new coast, you'll want to place your pipeline several

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1 hundred yards inland.

2 The presence of a refrigerated
3 pipeline crossing the coastline might retard thermo-
4 karst erosion at that location, causing an interference
5 with the natural process of erosion. The impact
6 created by retarding the thermokarst action is
7 apparently unknown.

8 The Arctic Gas Company Environ-
9 mental Report , volume five, provides a summary of the
10 hazards which will be imposed by ice grounding and
11 scour.

12 "Movement and grounding of large ice
13 masses could result in severe scouring
14 of the sea floor. The movements and
15 probably grounding location of the large
16 ice masses may be difficult to predict
17 and may also be impractical [in economic
18 and technical terms] ...to design against.
19 If the pipe is buried below the deepest
20 scour, the probability of having an ice
21 mass ground and produce a direct impact
22 on the pipe is very remote. If, however,
23 the ice mass were to contact the pipe
24 upon grounding, the pipe in all probability
25 would buckle or break."

26 .Continuing the quote:

27 "Most pressure - ridge keels are less than
28 40 feet. Isolated, these ridges will cause
29 little scouring during grounding. However,
30 if ...[these ridges] are imbedded in larger

1 floes, they can cause considerable
2 scouring."

3 Because sea ice will damage
4 parts of the system protruding above the depth of
5 scour, as at the junctions with compressor stations,
6 and because of limited accessibility for repair,
7 block valves will not be installed offshore. This
8 will required a variance in established national
9 safety procedures for pipeline construction and
10 operation.

11 Alaska's "Environmental
12 Assessment of the Proposed Beaufort Sea Nearshore
13 Petroleum Leasing" states, and I quote:

14 "Hazards to Beaufort nearshore animals
15 and ecosystems accompany oil development
16 activities. The kind of losses sustained
17 by the biota of the area and the extent
18 of such losses are related to four main
19 variables: 1) frequency of major oil
20 spills; 2) extent of chronic and cumula-
21 tive pollution, mainly from oil spills and
22 sewage; 3) changes in currents, inshore
23 ice action, salinity, and sedimentation
24 processes resulting from physical alterations
25 of nearshore[activities]..."

26 'And I'll interject as with the building of gravel
27 causeways as one example.

28 "...4) behavioural disturbances from acute
29 or persistent human activity. None of these
30 can be quantified at the present time.

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1 The most likely sources of risk to bird populations
2 include disturbance or elimination of island-nesting
3 terns, gulls, and eider, and direct mortality to
4 waterfowl and seabirds from oil spills. Mammals
5 most likely to be affected are polar bears which den
6 in the area, ringed seals, and carnivores like polar
7 and grizzly bears, arctic fox and wolves. Fish
8 populations risk mortality from seismic detonations
9 and oil spills and they may suffer habitat losses
10 from gravel removal and siltation. Plankton and
11 invertebrates, basic food sources in the arctic
12 ecosystem could suffer temporary or long term losses
13 from large oil spills, cumulative buildup of oil or
14 other toxic compounds in muds or waters, and changes
15 in currents, ice forces, and salinity affecting the
16 nearshore environment.

17 In the long run, chronic
18 discharges of petroleum, drilling compounds,
19 brines and heavy metals may be more damaging to
20 marine species of the area than the large, but
21 infrequent spills or discharges."

22 These same conditions are
23 expected to occur with the offshore alternate
24 pipeline system, that is gas pipeline system, except
25 that the possibility of oil pollution is much more
26 limited.

27 The offshore alternate route
28 concentrates all facilities and human activities on the
29 coast of the Beaufort Sea. These new facilities,
30 especially compressor stations and their requirements

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1 for regular inspection and maintenance will
2 adversely affect polar bear denning along the
3 Alaskan coast of the Beaufort Sea. Human activities
4 will influence all polar bears moving inland to den
5 on the Coastal Plain of the Arctic National Wildlife
6 Range. These adverse impacts will cause polar bears
7 we feel, to seek new, possibly less favourable
8 denning areas with resultant reduction of polar bear
9 populations in the Beaufort Sea. We have not, and I
10 interject here, we have not been able to quantify
11 that possible effect up to this time.

12 Construction activities will
13 take place on marine segments during the summer time,
14 but the ice breakers will be used to prolong the
15 construction season. Thus it is possible that
16 polar bears using offshore ice would be deflected
17 to other areas, compounding population losses
18 due to the loss of shore or land denning areas.

19 It is concluded that the offshore
20 alternate route will have an immediate and long term
21 adverse impact on polar bear use of the Beaufort
22 Sea coast between Prudhoe Bay and the United
23 States -Canada border with significant, but unknown
24 reduction in the number of polar bears.

25 The Offshore alternate route
26 would concentrate facilities and human activities
27 along the coast in key bird habitat areas. Construction
28 of facilities such as ports, compressor stations,
29 and airfields will destroy some important habitat. How-
30 ever, impacts on birds will result from construction and

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1 operation of facilities as well.

2 Facilities of the alternate
3 route located on land include the initial 64 miles of
4 pipeline, block valves, heliports and the first
5 compressor station. Coastal facilities (all within
6 the Arctic National Wildlife Range) include three
7 compressor stations, three port areas, communication
8 towers, and between three and six airfields.

9 It is assumed that actual
10 construction of land facilities would take place
11 during the winter when most birds were not in the
12 Beaufort Sea area. Activities for obtaining sand and
13 gravel from borrow sites in active river flood
14 plains will occur during summer and fall. Noise
15 and human activity associated with summer borrow
16 pit operations will cause birds to relocate to other
17 areas.

18 Alaska Arctic Gas Pipeline
19 Company notes that low-flying aircraft and operation of
20 compressor stations are especially disturbing to
21 birds along the arctic coast and will cause birds to
22 move to other areas. Studies for this company show
23 that molting sea ducks traditionally concentrate
24 and use areas directly associated with the offshore
25 alternate route. Low-flying aircraft will change
26 normal feeding behaviour causing the birds to abandon
27 traditional use areas. Moulting sea ducks go as
28 far offshore as two and a half miles to feed. Marine
29 pipeline construction will take place at a time and
30 at a location which infringes on these offshore

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1 feeding areas. Gollop and Davis in studies done
2 for the Alaskan Arctic Gas Pipeline Company found
3 that noise similar to that made by a compressor
4 station will eliminate snow geese from an area and
5 would also adversely affect other molting waterfowl.

6 During the summer, spilled
7 fuel, lubricants, or toxic substances will come into
8 direct contact with large numbers of bird life
9 and could kill many birds. The offshore alternate
10 route increases the probability for spills occurring while
11 birds are present since first the periods of peak construc-
12 tion will be during the two consecutive summer marine
13 construction periods, and two, storage will be at
14 sites immediately on the coast in critical habitat
15 areas.

16 In summary, the offshore alter-
17 nate pipeline route concentrates facilities and
18 human activities directly in key bird staging,
19 nesting, feeding, and molting areas. Summer construc-
20 tion activities, noise from compressor stations, and
21 repeated use of low flying aircraft will have large,
22 direct and adverse impacts on bird life along the
23 Beaufort Sea from Prudhoe Bay to the United States-
24 Canada border. Major breeding populations could
25 be completely lost and significant shifts in total
26 population numbers and distribution of birds now
27 using the area will result from the Offshore route.

28 Marine habitat for fish are
29 expected to undergo substantial alterations of unknown
30 amounts. These will affect marine spawning, rearing,

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1 feeding and overwintering areas. Fish populations
2 will be lost locally and in some instances may be
3 affected over large areas if rearing or overwintering
4 areas are altered because of the multi-age structure
5 of aquatic populations in the Arctic.

6 The offshore alternative will
7 cause disruption of benthic communities as a result
8 of the construction, operation and repair of a
9 chilled pipeline buried in the bed of the Beaufort
10 Sea.

11 THE COMMISSIONER: Excuse me,
12 "benthic" communities?

13 A Benthic, B.E.N.T.H.I.C.

14 THE COMMISSIONER: Well, what
15 does that mean?

16 A The communities of animals
17 living on the sea floor.

18 The offshore route involves
19 construction of 141 miles of marine pipeline and
20 facilities, compressor station complex and ports
21 adjacent to estuarine areas. Microscopic organisms
22 living in these areas are the foundation of the
23 food web reaching through fish, birds, sea mammals,
24 and polar bears and man.

25 Maintenance and repair of the
26 marine segments of the offshore alternative system
27 will introduce many unsolved problems. In 20 to 30
28 feet of water, conventional marine repair techniques
29 are limited to the same July to mid-October period used
30 for construction because of ice conditions. The

1 critical period of break up, that is, May to the
2 end of July and freeze up, mid-October to December,
3 make repair access difficult if not impossible because
4 of the likelihood of the presence of moving masses
5 of ice.

6 MR. ANTHONY: Q Would you
7 go on then with the consideration of the main
8 ecological features of the Fairbanks alternative,
9 please.

10 A The significant feature
11 -- ecological feature of the Fairbanks route is
12 the tremendous variety of topographic and ecologic
13 provinces that the route traverses. The essential
14 difference of course with the Fairbanks alternative
15 is that these various environments are traversed
16 within and along established transportation corridors
17 rather than cross country. But this is a matter which
18 I will discuss shortly and Commissioner Parker will
19 discuss in greater detail.

20 In a general sense I can
21 say that the Fairbanks, of the Fairbanks route,
22 that beginning at the Arctic Coast and south across
23 the Arctic Plains, the region is characterized by
24 numerous thermokarst lakes, that is, lakes resulting
25 when ice, blocks of ice in the soil melt, polygonal
26 ground patterns and areas between lakes of wet
27 tundra. The numerous pingos in the area are
28 indicative of the high ice content and continuous
29 permafrost in the region. An excellent description
30 of the vegetation and biotic features of the Arctic

Coastal Plains physiographic province, can be found in the Arctic Regional Profile which I have tabled earlier. In crossing the Brooks Range the Fairbanks route lies within the valleys of the Sagavanirktok and Atigun Rivers on the north of the divide and the Dietrich and Middle Fork Koyukuk Valleys on the south, and these are certainly significant features in themselves. I again refer you to the Arctic Regional Profile. Incidentally, Mr. Commissioner, to interject at least a smile to this discourse, recently in Alaska, the test of whether one is an Alaskan is how well one can pronounce "Sagavanirktok", and I must say that many Texans have practiced this assiduously so that by the time they come here they are already Alaskans.

THE COMMISSIONER: We shall remember that and devise a similar test in Canada.

A The valleys along this Brooks Range area of the Fairbanks route, are from one quarter to three miles wide, surrounded by 6500 to 7500 foot high peaks. The pass at the continental divide is 1400 feet high. After leaving the Brooks Range the route traverses rolling, hilly country with intermittent forested areas and crosses the Yukon River. The poorly drained lowland areas between the Yukon River and Fairbanks provide important waterfowl habitat. From Fairbanks the route follows the Richardson and Alaska Highways along the right side of the braided Tanana River to Big Delta, a town approximately 95 miles south of Fairbanks.

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1 This valley is from one to 25 miles wide with
2 elevations between 1200 and 2,000 feet. The
3 Yukon - Tanana upland lies along the northern margin
4 of the valley where unglaciated rolling hills are
5 generally less than 2000 feet above the valley floor.
6 These uplands provide unique wildlife habitat but
7 are also interesting as biological refugia. That is,
8 places where wild critters have survived during
9 glacial stages elsewhere in Alaska. A more detailed
10 description of this area south of the Brooks Range
11 can be found in the Land Use Planning Commission's
12 publication, resources of Alaska, pages 14 and 283.

13 The general ecosystems map for
14 the state which I have tabled includes the corridor
15 alternatives and may be a useful general guide to
16 significant ecological provinces along this route.

17 The problems associated with
18 the interaction of the chilled gas pipeline and
19 areas of intermittently frozen and unfrozen ground,
20 have been described as they relate to the Fort
21 Yukon route, the impacts along the Fairbanks route
22 would be similar, but again line inspection, line
23 maintenance and repair activities could be conducted
24 during any time of the year with virtually no further
25 damage to tundra or other vegetation communities and
26 this seems to me to be a very significant environmental
27 consideration. It is also important to note that
28 along the route of the Alyeska pipeline, soils and
29 river hydrology have been extensively studied and are
30 thoroughly understood. There will, literally be no

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surprises of a major sort relating to soil and permafrost conditions along this route, as least as far as Fairbanks. This represents a significant safety factor as well as a savings in time and money spent for soils and hydrologic research for a gas pipeline route.

The majority of the environmental impacts of pipeline construction along the Fairbanks corridor will relate to the cumulative affects of noise, pollution, competition for scarce water resources and so on. These impacts will be minimized to a considerable degree because of the tremendous amount of scientific research which has been directed towards identifying similar problems for the oil pipeline route and construction. Utilization of existing corridors should not only concentrate these impacts within a carefully controlled and controllable zone, but will allow the conservation of scarce resources, since construction of new facilities will be minimized.

Q Would you please describe the critical environmental considerations you feel apply to the Fairbanks route and elaborate those that you feel are most significant.

A Many of the anticipated problems relating to permafrost degradation, disturbance to wildlife and river crossings have been mentioned in regard to the interior route and I won't repeat myself here. Additional concerns exist with regard to slope stability and the portions of the route

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1 which traverse areas of discontinuous permafrost.
2 Slope stability is a consideration simply because
3 the route through the Brooks Range will encounter
4 relatively steep terrain and revegetation, erosion
5 control and other measures to counter the soil
6 slippage problems, will be more difficult to implement
7 and correspondingly less effective. In the mountainous
8 areas this can result in serious threats to pipeline
9 integrity. It is anticipated that use of the existing
10 gravel pads of the Alyeska pipeline right-of-way can
11 significantly mitigate the impacts of construction
12 in these areas as would be true for the rest of
13 the route. This is especially important for summer
14 time repair and maintenance activities which would
15 otherwise have to be carried out over the exposed
16 tundra.

17 MR. ANTHONY: Thank you,
18 Dr. Weedon.

19 THE COMMISSIONER: Well, I
20 think we could adjourn say, until 2:30, would that
21 be all right, Mr. Goudge?

MR. GOUDGE: Perhaps 2:40.

23 THE COMMISSIONER: All right,
24 2:40 and then we'll have the pleasure of hearing
25 from Commissioner Parker.
26 (ARCTIC REGIONAL PROFILE MARKED EXHIBIT 179)
27 (RESOURCES OF ALASKA VOLUME MARKED EXHIBIT 180)
28 (MAP --MAJOR ECOSYSTEMS OF ALASKA MARKED EXHIBIT 181)
29 (LAND STATUS MAP OF ALASKA MARKED EXHIBIT 182)
(DRAFT ENTITLED "THE PROPOSED BEAUFORT SEA NEARSHORE

1 PETROLEUM LEASING REPORT" MARKED EXHIBIT 183)

2 (PROCEEDINGS ADJOURNED)

3 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

4 MR. GOUDGE: I wonder
5 if we could reconvene after the lunch break.

6 THE COMMISSIONER: Mr. Anthony,
7 would you carry on.

8 MR. ANTHONY: On the advice
9 of the other participants I propose to have Mr.
10 Parker now read his statement that he wishes to
11 read to the Inquiry and then ask Mr. Weedon to
12 merely file the state's position and then cross-
13 examine both of them, if that is appropriate.

14 MR. MARSHALL: Do I understand
15 correctly that both witnesses will be available
16 for cross-examination?

17 MR. ANTHONY: Well, I don't
18 know the answer to that. I would hope that we could
19 see how things go this afternoon.

20 MR. MARSHALL: Well, sir, if
21 Dr. Weedon is not going to be available tomorrow
22 I would like to ask him a couple of questions today.

23 THE COMMISSIONER: Well, cer-
24 tainly.

25 MR. MARSHALL: At least more
26 than a couple, it might take quite awhile.

27 MR. ANTHONY: My understanding
28 is that Dr. Weedon will be here tomorrow morning.
29 The only question we have now is whether or not
30 urgent matters at the state capitol require Mr. Parker

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1 to fly back this evening, so we're still trying to
2 get that sorted out, but Dr. Weedon will be available
3 for my friend and perhaps at the end of the evidence
4 in chief, if he has questions particularly for
5 Mr. Parker, he could concentrate on those and Dr.
6 Weedon would be available to carry on tomorrow morning
7 and hopefully both of them will, but I hope to know
8 better later this afternoon.

9 MR. MARSHALL: Well, sir,
10 I haven't had a chance to look at Mr. Parker's
11 evidence. This copy has just been made available
12 to me, I have no idea -- I do feel it's quite
13 awkward and a bit of an imposition on Arctic Gas
14 and perhaps the other participants to be put in
15 this position. I think we as lawyers all appreciate
16 that once a witness's evidence has gone in and
17 remains unchallenged on the record that it has a
18 certain impact and there is a disadvantage when you
19 are not allowed or permitted by circumstances of
20 time and so on to cross-examine the witness until
21 much later.

22 MR. ANTHONY: Well, Mr. Commissioner,
23 er, I suggest that these gentlemen are coming as a
24 panel, their evidence is going to be complementing
25 each other and the reason for asking their evidence
26 to go in before questioning is that I think perhaps
27 some questions may be answered, or there may be
28 another perspective that my friend wants to pursue.
29 Now, there's no intention of spiriting these gentlemen
30 away as soon as the evidence is over and I am confident

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1 that within the logistic problems we have, these
2 gentlemen will be available today, they hopefully
3 will be available ' tomorrow morning and if not we
4 will endeavour and I am sure they have indicated
5 that they will endeavour to return at a later date
6 and there is nothing further I think we can do to
7 accomodate --

8 THE COMMISSIONER: All right,
9 well, let's do the best we can and let's begin
10 by completing their presentation of their evidence
11 in chief.

12 MR. ANTHONY: Mr. Commissioner,
13 following the hearing this morning I made copies
14 available of Mr. Parker's statement to my friend,
15 Mr. Marshall and the other counsel had already
16 left the table and I am just now distributing it to
17 him and a copy to yourself, that will similarly be
18 filed as an exhibit.

19 THE COMMISSIONER: All right.

20 MR. ANTHONY: I would ask Mr.
21 Parker, if you would please address the Commission.

22 WITNESS PARKER: A Yes, Mr.
23 Commissioner, first I'd like to say that we were
24 happy to be invited here to provide information and
25 some evidence to this Inquiry and we're all going
26 to be living in the north with these problems for
27 a good many years and the more we can learn from
28 each other the better off we are going to be, and
29 that was certainly Governor Hammond's reason for
30 giving Dr. Weedon and I permission to appear at this

1 Inquiry. In any case, my testimony today will cover
2 two principle areas, the first being the development
3 of the concept of transportation corridors and
4 their utilization in Alaska, and the second being
5 to detail some of the environmental and construction
6 problems associated with present pipeline and road
7 construction in Alaska.

8 First, to get to the transporta-
9 tion corridors, they've been in Alaska both as a
10 concept and as an actual easement or legal withdrawal
11 of land; for many years they've been advanced for
12 several reasons over the past two decades. It is
13 not something new. Among the most common reasons
14 being as an environmental restriction to limit
15 transportation impacts on land as a means of making
16 joint use of facilities which can be shared by
17 transportation modes and as a tool of regional
18 development based on the thesis of surface transport-
19 ation or the lack thereof, is the limiting factor
20 in economic development.

21 Now, the first of these reasons
22 was used by early conservationists and environmental-
23 ists in Alaska and elsewhere as a means of defining
24 where surface transportation facilities should be lo-
25 cated in order to limit their impact upon the wild
26 lands and the wilderness areas. By the designation
27 of corridors it was hoped that a plethora of roads
28 spreading over the landscape could be avoided. Now,
29 this concept is still advocated by some conservation-
30 ists as a basic tool of land planning but seems to be

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1 used less and less as the term "transportation
2 corridor" becomes more and more associated with the
3 maximized development scencario. The concept
4 had certain validity in that it did limit transportation
5 impacts. However, those who advocated it never did
6 follow through to examine the environmental impacts
7 that would be associated with placing transportation
8 facilities in corridors that were unsuitable for
9 them. Some of the side effects of this action
10 could of course be unnecessary degradation of water
11 quality due to erosion or unnecessary impact upon
12 certain wildlife habitats because of an over concen-
13 tration of transportation facilities.

14 The concept of utilizing
15 corridors as a means of making joint use of
16 facilities has always existed and is of course
17 found throughout the world. The pragmatic problem
18 in attempting to force modes into the same corridor
19 are that railroads and roads cannot always follow
20 the same alignment, nor can roads always follow
21 pipelines in their alignment. If the design corridor
22 is too narrow and modes are restricted within it,
23 there are bound to be eventual inefficiencies in the
24 system such as too steep grades, unsafe curves or
25 other unsatisfactory geomorphological and geotechnic
26 situations. What this amounts to is that there is in
27 any particular geographical situation a best route
28 for a certain mode to follow and regional planners must
29 decide whether they want to sacrifice efficiency of the
30 transportation mode to land ownership and land management

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boundaries or seek the best possible right-of-way. We have many, many situations in Alaska where highways and railroads follow along and then diverge from each other for several miles and then come back together. The situation exists between Seward and Anchorage and between Anchorage and Fairbanks, and the proposed route for a railroad to the North Slope, diverges widely from the recently constructed highway to the Arctic Ocean. Thus if corridors are selected, in many cases they will be so broad as to almost make it a meaningless concept.

The use of corridors as a tool in regional development has also been around for a long time. It was most recently used in Alaska by the North Commission which was appointed in 1966 to develop corridors for the extension of railroads to the Arctic and to Western Alaska. This development was based on the thesis that it was the lack of railroad access which was inhibiting development of those regions. I personally have never accepted the thesis that the lack of surface transportation infrastructure was a barrier to resource development. This thesis was also developed by several others, among them being Tussing and Erikson in their publication Mining and Public Policy in Alaska. I expanded at some length on this theme in a recent speech to the Society of Automotive Engineers in Seattle which I will offer as an attachment to this testimony.

MR. ANTHONY: Mr. Commissioner, that will be filed as an exhibit, in this Inquiry.

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1 THE COMMISSIONER: Yes, please.

2 A In any case the arguments
3 have been going on for several decades in Alaska
4 as to whether transportation facilities must
5 precede development or whether the resource should
6 first be located before the transportation facility
7 is built. The battle lines are still drawn on this
8 issue and neither side shows any signs of retreating.

9 I would only point out that
10 the Prudhoe Bay oil fields were explored and pre-
11 liminary development occurred with only the most
12 minimal surface access over an ill conceived ice
13 road. The amount of tonnage brought in by ice
14 road was probably something in the order of less than
15 one per cent of the tonnage that was brought in
16 to the Prudhoe area during the seven year period from
17 1968 to October 1974 when surface access was finally
18 achieved to that area. We have mining districts in
19 Alaska which have been served by roads since the 1930's
20 which show no signs of activity at the present and which
21 have resulted in no economic return to the State
22 or National government over the past several decades.
23 The point has been proven to me at least that lack of
24 surface transportation is not the inhibiting factor
25 to resource exploration in the Arctic. The time
26 for surface transportation comes once you have found
27 your resource and defined its economic and physical
28 limits.

29 I would like to explain as re-
30 quested at this time, the basic transportation system

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1 that exists in Alaska now. There are in this system
2 obvious geographic corridors for surface transportation
3 if we accept a corridor as a geographical and
4 geomorphological expression. Some of these are
5 in use in Alaska at present such as the corridor
6 to Windy Pass and Broad Pass , and I can point these
7 out, or possibly Dr. Weedon could, which is shared by
8 the Alaska Railroad and the George Parks Highway.
9 There is also the corridor through Isabel Pass which
10 is shared by the Richardson Highway and the
11 Alaska Oil Pipeline now under construction. Another
12 corridor is the multi-modal and international
13 corridor from Prince Rupert to Fairbanks which is
14 comprised of the Alaska Marine Highway System, the
15 Haines Highway and the Alaska Highway. From Haines
16 to Fairbanks, this corridor was once occupied by a
17 small pipeline which is still there by not in use.
18 Most of the corridors now in use were created without
19 any formal withdrawal of corridors by the land manager.
20 It is important at this time to make the distinction
21 between the corridor as a planning concept and the
22 corridor as an easement. It is also important to make
23 the distinction between the previous two concepts
24 and that of the corridor as a land withdrawal.

25 As shown on the land ownership
26 map previously submitted in evidence, there have
27 been two withdrawals by the Secretary of the Interior
28 for transportation modes in Alaska. The first with-
29 drawal is utilized by the Alyeska pipeline and by the
30 State's secondary highway from the Yukon to Prudhoe

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1 Bay. South of the Yukon the withdrawal is utilized
2 by the pipeline and at times by the State highways
3 which existed prior to the withdrawal. The second
4 withdrawal was south of the Arctic wildlife range.
5 This is the only existing corridor withdrawal which
6 joins to the Canadian border .

7 The way in which the withdrawals
8 work on the federal land is that permission must
9 be secured from the federal land manager, in this case
10 the Bureau of Land Management, for any action occurring
11 on federal lands in the withdrawal. This insures that
12 the transportation system will not be co-opted by some
13 other form of development and also that land
14 speculators will not obtain lands in the path of
15 major transportation facilities. Also environmental
16 controls can be applied with greater power through
17 stipulations.

18 Within the Valdez to Prudhoe
19 withdrawal are contained rights-of-way granged by the
20 federal government for the Trans-Alaska pipeline
21 and also rights-of-way for the state highways, some of
22 which existed prior to the withdrawal as stated
23 before and some which were obtained after the land was
24 withdrawn. Within the Trans-Alaska pipeline right-
25 of-way the actions of the Alyeska Pipeline Service
26 Company are governed by a lease agreement between
27 the Federal government and the seven member companies
28 of the Alyeska consortium. Within the state's
29 right-of-way the State of Alaska controls the right-
30 of-way consistent with adherence to state and
31 federal water quality and other environmental

1 regulations.

2 As the map shows, there is no
3 withdrawal across private, borough, or state lands.
4 Across these lands Alyeska has secured a right-of-
5 way. In the case of state lands Alyeska actions within
6 the right-of-way are governed by a lease agreement
7 between the pipeline companies and the State of
8 Alaska, in the case of borough and private lands, Alyes-
9 ka is building the pipeline across borough and
10 private lands in substantially the same manner as
11 across state and federal lands.

12 The two corridor withdrawals
13 by the Secretary of the Interior were based upon
14 routes selected by the Alyeska Pipeline Service
15 Company, actually its predecessor in the case
16 of the Prudhoe - Vladez corridor and the Arctic Gas
17 Company in the case of the south of the Wildlife
18 Range there was certainly a good deal of evaluation
19 of soils and hydrological conditions for alternative
20 routes by federal and state agencies. However, most
21 of this evaluation was based upon existing data
22 in the files with some field reconnaissance. Evaluation
23 of gravel availability was based upon known data and
24 some exploration by the pipeline companies. Available
25 data on wildlife population in government files
26 was supplemented by private effort. Fish populations
27 were given some attention. In general the environmental
28 evaluation of these withdrawals and alternatives were
29 based upon existing governmental data in the early
30 phases which was supplemented later private investigations

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1 Most of the thorough going analysis on the pipeline
2 was done after the routes were chosen for withdrawal,
3 not before.

4 Before proceeding further with
5 an examination of the corridor concept as it now
6 presently exists, I would like to return and explain
7 in more detail the transportation system in Alaska.
8 The Alaska Highway system, in its present form,
9 began with the Richardson Highway from Valdez to
10 Fairbanks which was originally a dog trail, then a
11 wagon road and gradually between the two world wars
12 was improved to the point where it was a reasonable
13 truck route in the 1930's. The major transportation
14 investment in Alaska in early years as far as land
15 surface transportation investments go were of course
16 the Alaska Railroad from Seward to Fairbanks which was
17 completed in 1921 and the Copper River and Northwestern
18 Railroad which was completed in 1914 and last used in
19 1938.

20 In the case of the Alaska Rail-
21 road we have a prime example of the situation where
22 a transportation route is created into underdeveloped
23 country. Such routes can have some effect in shaping
24 later development, but not always. The Alaska Rail-
25 road was certainly a factor in bringing military bases
26 to Anchorage and Fairbanks during World War II and
27 thus creating the post-war position of the railbelt
28 as the population and economic centre of Alaska.
29 It is important to remember that until World War II the
30 railroad did not generate significant population

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1 increases in Alaska. Anchorage at the time of
2 Worl War II numbered only around 3,000 people as
3 did Fairbanks which were not substantial increases
4 in population from the day that the railroad was
5 finished. This was in 1921. It was the creation
6 of the military bases and their large population and
7 large service demands that provided the economic
8 accelerator for the Alaska rail belt.

9 The Copper River and Northwestern
10 Railway is a case of the other extreme where creation
11 of a major transportation system did not result in any
12 premanent development. When the railway operation
13 ceased due to the shut-down of copper mining activities
14 by Kennecott at McCarthy the railroad was never
15 used again. There was no economic activity to
16 justify its continued existence.

17 Returning to the Alaska Highway
18 system, during the 1930's the road system was
19 extended from Fairbanks to the mining areas at
20 Livengood and Circle. Despite the existence of a
21 road, mining operations in these areas have been
22 largely discontinued and shortly after World War
23 II. Minor road extensions were pushed forward from the
24 Matanuska Valley, the Anchorage area and the
25 Kenai Peninsula, but the funds were not available to
26 link up these isolated road systems until funding
27 became available in World War II. In World War II
28 the Alaska Highway was of course built providing
29 the state with its first surface connection with the
30 United States, the Richardson Highway was substantially

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improved, the Gleen Highway was built providing Anchorage for the first time with access to the main highway system. After Worl War II highway construction continued with the completion of the highway to Seward, the Sterling Highway to the Kenai Peninsula and its eventual extention to Homer. This was largely the situation when Alaska achieved statehood in 1958. Since statehood in 1958 the state has been able to afford only one major new publicly funded highway, the Anchorage to Fairbanks highway which has been under construction for the past 17 years and on which the final section will be paved shortly. In fact, it was paved about three days ago. The greater part of the state's effort has been in upgrading the minimal road system inherited at statehood.

The next great road extention finished in October in 1974 , finished in that it was drivable, is of course the highway from Livengood to the Yukon to Prudhoe Bay. This highway was built by the Alyeska Pipeline Service Company as a contractor to the state and paid for by that company. It is a state secondary highway by action of the legislature and will be taken over by the State of Alaska upon satisfactory completion of it by Alyeska whenever that company is substantially finished with its use of the road in pipeline construction.

Transportation planning in Alaska now relates to the Fairbanks-Anchorage corridor and the associated central Alaska highway system because the great bulk of the state's population and business

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exists there. Here, the state must maintain a general transportation structure which serves the needs of resource development but primarily serves the existing population. Resource development projects such as the oil pipeline and the associated road will be extended from this central complex when feasible. This will not always be possible unless the costs can be borne by the resource developer.

The problem which the state will face in taking over roads such as the Arctic Road and any future roads built under similar conditions and incorporating them into the state general transportation network is simply will the roads generate enough activity to justify their maintenance costs? There is the additional problem of all the other services that must be provided along any road such as police, safety, services, recreation and a host of other additions to the state's budget. These decisions will naturally be made by the legislature during the budgetary process. If future legislative desire is to fund an expensive system of minimally utilized roads that are inherited from resource developers why the state will naturally do so. Under an ideal system user costs would be the determining factor on the amount of road utilization. Under the system where there are so many general uses of any road it is extremely difficult to allocate such costs however except through the gas tax. The problem of recovering the revenues for all the ancillary services needed in addition to road maintenance is far

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1 more difficult to handle.

2 I would now like to address the
3 question of the corridors as proposed by the Bureau of
4 Land Management in their Preliminary Conceptual
5 Analysis of October 1974. Copies of these documents
6 have been made available to the Commission.

7 MR. ANTHONY: Mr. Berger, if
8 I may you'll recall that during your trip to Alaska
9 I believe Mr. Waddell obtained a copy of the
10 Preliminary Conceptual Analysis and made them available
11 to the various participants. I can make this an
12 exhibit if it has not been done so.

13 THE COMMISSIONER: I think
14 you should, yes.

15 MR. ANTHONY: Well, this will
16 be the exhibit and it is this document that Mr.
17 Parker is now referring to.

18 A The state of intent of
19 the analysis was to outline the urgent need for
20 identification of a statewide transportation system
21 in which five major considerations were considered:
22 1) Making reservations for public access across land
23 being transferred into private native ownership
24 under the provisions of the Alaska Native Claims
25 Settlement Act; 2) Develop whatever rational plan
26 for movement of high value energy resources from remote
27 areas of Alaska which minimizes adverse environmental
28 impacts and to prevent proliferation of separate
29 rights-of-way in accordance with the principles
30 established by Title I of the Mineral Leasing Act of

1 1920, amendments and Trans-Alaska Oil Pipeline
2 Authorization; 3) Assessments of the need for a
3 system of national transportation and utility
4 corridors across federal lands; 4) Assessment of
5 Potential Routes through Alaska for construction of
6 pipelines and other transportation systems for the move-
7 ment of natural gas and oil from Alaska through
8 Canada to markets in the conterminous United States;
9 5) Preparation of the joint environmental impact
10 statement by the Department of the Interior and
11 Federal Power Commission evaluating application of
12 the Alaskan Arctic Gas Pipeline Company and the El
13 Paso Alaska Company to transport natural gas from
14 the Prudhoe Bay field.

15 The above intents if carried
16 out, would have been achieved by making public
17 easement reservations across lands being conveyed to
18 Alaska natives under the provisions of the Alaska
19 Native Claims Settlement Act and by securing the
20 state's co-operation in making such easements across
21 state lands with accompanying easements across
22 federal lands.

23 The State of Alaska disagreed
24 with the analysis for two principal reasons:
25 1) The feeling that if easements of this
26 magnitude were secured at this time with the minimal
27 information that is available it would essentially co-
28 opt most future transportation planning in Alaska
29 by linking it to these designated easements; 2) That
30 the easements were not that critical since only
31 12% of the corridors which traverse native land and the

1 rest would be across state and federal lands where
2 future easements should be readily available unless
3 congressional action prohibited the designation
4 of easements across national parks or similar
5 designations of federal lands.

6 The disagreement with the
7 study in the first instance gets to the heart of the
8 whole concept of transportation corridors. The essen-
9 tial question is can you really determine the best
10 transportation corridor before the real use for such
11 corridor has been outlined? Another way of stating
12 the question is can future transportation needs
13 be accurately predicted one and two generations in
14 advance? A survey of recent history reveals that the
15 original withdrawal for the Trans-Alaska pipeline
16 was through Anaktuvik Pass. You might show that,
17 Bob. This withdrawal was shifted 50 miles eastward
18 to Dietrich Pass when it was found that Anaktuvik was
19 not a suitable pipeline location route. Although
20 this shifting of a withdrawal was easily accomplished
21 by Secretary of Interior action, it is not reasonable
22 to expect that easements or corridors which have been
23 in effect for several years would be as easily
24 shifted.

25 Another point on which we
26 disagreed was the wisdom of physically selecting
27 corridors at this time which would be useful for
28 all or several modes of surface transportation. There
29 is not enough knowledge of soils, hydrology, or gravel
30 sources to make real location studies at this time.

1 Recognizing this the corridors are six miles wide,
2 but even within six miles one would be very likely
3 to not find the right route in many cases.

4 In the second reason for
5 disagreement the State felt that there was little
6 equity to the private landowners in this case, the
7 Alaska natives, in placing such a restriction as a
8 corridor easement across lands being transferred
9 to them in fee simple title. In the analysis
10 done by the Land Use Planning Commission the attempt
11 was made to quantify right-of-way costs across
12 native lands and the resulting figure of something
13 over \$1,200,000.00 a corridor, which should be
14 inserted, was obtained. One can quarrel with this
15 assessment by the Land Use Planning Commission, but
16 I think it is indicative of the scope of the real
17 problem in obtaining easements across native lands in
18 the future. No doubt problems will arise as always
19 exists in securing right-of-way across private lands.
20 In our experience at the Department of Highways
21 we are accustomed to some hard fought battles with the
22 citizens in securing right-of-way. We feel that this
23 is the correct way and that otherwise the equity
24 of the citizen would be too easily destroyed. The gov-
25 ernment should definitely have to prove its need
26 for right-of-way and the citizen does need resort
27 to the courts if necessary to protect his equity in
28 land. Certainly such a system is frustrating but
29 equity is always frustrating and difficult to achieve.
30 If I knew of a situation at this moment where the

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1 Department of Highways required right-of-way
2 across federal or state lands or across lands
3 about to be conveyed from public to private lands, I
4 would be the first to assert the need for a public
5 service easement for a road across those lands.
6 However, if we cannot legitimately establish a pro-
7 ject as part of our Five-Year Program we do not feel
8 we have the right to seek such easement at this time.
9 I have been putting together multi-year programs, norm-
10 ally five-year programs, all of my working life
11 and have not acquired in the process much more ability
12 to foresee the future than I possessed when I
13 began. I have experimented with a great deal of
14 long range planning projects and it has proven to
15 me to be a practical impossibility to reduce those
16 plans to capital investments in the public sector
17 too far in advance. The only way in which this can
18 be achieved is by projects such as Apollo where a
19 goal is set. However, projects such as highways
20 must be responsive to the developing needs
21 of society and not built as a goals in themselves.

22 The future of transportation
23 planning in Alaska rests upon two principal bases:
24 the development of a general system of ports, highways,
25 railroads and the air system to meet the needs
26 of the resident population. We are aiming for a
27 system which will have maximum flexibility in
28 responding to needs and efficient intermodal in-
29 terfaces for it is by these that costs can be
30 substantially lowered.

1 We will continue to develop systems
2 to serve resource development. In some cases these will
3 be a part of the general system, sometimes there will
4 be little comparability. In any case, first there
5 must be a defined resource and a defined market
6 before the system is built. The state will then inter-
7 ject such planning as is nessary to mitigate any impact
8 the system will have on other segments of Alaskan
9 society and to secure the most efficient interaction
10 with other transportation systems. We are developing
11 a pragmatic working model as the Trans-Alaska Pipeline
12 and it associated haul roads are completed.

13 I would now like to discuss the
14 environmental aond construction problems associated with
15 Arctic and sub-Arcitc pipelines and roads as we have
16 experienced somewhat thus far.

17 Our experience in Alaska thus
18 far in the construction of the oil pipeline and its
19 associated haul roads has provided some in sight
20 into the problems which future similar projects will
21 face. We are learning a great deal from both of
22 these projects on how we can best mobilize state
23 resources to monitor the project without diminishing
24 services to other sectors of our society. One of the
25 first things we have learned is that a major pipeline
26 will probably require continued adequate surface
27 access for the mobilization of equipment. I should
28 carefully define thatfor the mobilization of equipment
29 during the construction phase. This will probably
30 mean a good all weather gravel road. At one time it

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1 was thought that equipment and material could be
2 transported over work pads and minimal roads.
3 Experience thus far with the Trans-Alaska oil
4 pipeline indicates that this would be extremely
5 difficult to accomplish.

6 There are several reasons for
7 this among them being the difficulty in accomodating
8 construction schedules to weather. Minimally
9 constructed roads degenerate during periods of rainfall
10 and do not stand up under heavy truck traffic of the
11 type that has been present during Alyeska construction.
12 In addition such roads result in slow moving traffic
13 and increase the amount of equipment that must be
14 mobilized to move the tonnages necessary on these
15 large projects. The state highway that was constructed
16 in conjunction with the Alyeska project is a good
17 gravel road similar to the better parts of the
18 ALaska Highway. It is constructed to secondary
19 highway standards. It has proven satisfactory
20 for the movement of material in the amounts required
21 by this project.

22 During design review of the oil
23 pipeline there was a great deal of discussion about
24 the use of snow pads for winter construction. Here
25 the difficulty is in adjusting construction schedules
26 to other conditions. While the North Slope has a long
27 period of winter, it is notorious for its deficiency
28 of snow. In any case, the snow pads were discussed at
29 great length and general agreement was reached that they
30 would have only minimum utility in the construction of

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1 the oil pipeline. This decision was not reached
2 easily since many involved, myself among them,
3 wished to use the snow pads if at all possible
4 to minimize the use of gravel. We achieved our
5 minimal use of gravel through work pad construction
6 which is in effect a winter work pad which would allow
7 mobilization of heavy equipment once the ground is
8 well frozen and which would insure that heavy
9 equipment was off the work pad well prior to
10 thawing conditions. We are also utilizing thin
11 work pad construction laid over styrofoam insulation.
12 Some difficulty is being experienced with the thin
13 work pads and there has been a tendency to overlay
14 more gravel and generally bring them up in many cases
15 to normal work pad standards in order that construction
16 may go forward. Remember in this case the work
17 pad is handling only the traffic associated with
18 construction in its sector, but the great bulk of
19 the traffic is proceeding over the haul road or
20 over state highways in the southern sector of the
21 pipeline. As I stated before I am convinced that it
22 would be very difficult to mobilize large amounts of
23 equipment over long distances on a very minimal
24 road or work pads on which construction was underway.

25 The major physical problems in
26 construction of the present pipeline and haul road and
27 therefore the major environmental problems also have
28 been soils conditions and river crossings. In this
29 way it differs little from any other major construction
30 project except for the fact that it traverses 800 miles

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1 of widely varying soil conditions and that little
2 hydrological information was available for many of the
3 rivers that were crossed, or in the process of being
4 crossed.

5 The construction of the road con-
6 firmed earlier long held beliefs of the Department of
7 Highways and the private sector that a cover operation
8 over the existing surface should be used to the
9 maximum possible extent and that cuts in thaw
10 unstable permafrost soils should be avoided. Predic-
11 ting areas where thaw unstable soils exist is still
12 difficult and intensive boring programs are necessary
13 in areas of discontinuous permafrost. The problem
14 basically is in adjusting, in the field, construction
15 plans when the plans do not match the actual soil
16 conditions encountered.

17 Especially critical are areas
18 where the thaw envelope of a river system meets
19 and merges with permafrost areas. Coming up out
20 of river bottoms onto stream terraces has proven to
21 be an especially critical area and intensive testing
22 is recommended in these areas before any cuts are
23 made. As one proceeds farther northward the kame ter-
24 races and drumlins which have proven to be good
25 building sites in the areas that underwent glaciation
26 are no longer available due to the lack of glaciation
27 in Arctic areas.

28 In areas of discontinuous
29 permafrost soil conditions can vary widely and one
30 can proceed from good frost stable soils which can be

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1 treated in a normal manner to lens of pure ice in a
2 very short distance. The oil pipeline in its varied
3 sections will reveal more subsurface soils information
4 to us in the 400 miles of trench that will be opened
5 than has been available throughout the previous his-
6 tory of Alaska.

7 River crossings become more
8 complicated if one must transist from the above ground
9 construction mode to a buried mode for the river
10 crossing. This means that the transition is usually
11 made at the extremely critical areas along the lip
12 of stream terraces which were described previously.
13 Since there is a general lack of hydrological informa-
14 tion, scour depths must be computed on extremely
15 conservative basis. Also in the Arctic river banks me-
16 ander rapidly expecially when the river begins to
17 meander in thaw unstable soils. The river may meander
18 past the point of transition from the river crossing
19 to the regular pipeline mode. This too requires
20 extremely conservative engineering techniques to be
21 utilized.

22 Material sites, or borrow pits, and
23 the spoil disposal sites for wasting incompetent
24 unusable soils create the major visual scars on the
25 landscape. From the air, at least, these are far
26 more esthetically distrubing than the pipeline or
27 road system. Rehabilitation of these areas is diffi-
28 cult in the Arctic and they should be minimized
29 to the maximum extent.

30 The most pragmatic means of

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1 minimizing such sites is to mine gravel in stream
2 beds and flood plains to the maximum extent possible.
3 This, of course, creates problems in maintaining
4 water quality, river regimes and fish habitats.
5 Therefore, mining plans must be adhered to with
6 absolute discipline. If this is done the
7 flood plain and the stream sites cause less environmen-
8 tal trouble than upland sites and those which are
9 in the water table are much easier to rehabilitate
10 either by allowing the stream to resume its normal
11 action by removal of dikes or by maintaining the
12 dikes and creating new lakes. In any case, until
13 such time as technology provides another answer, the
14 utilization of gravel sources and the wasting of thaw
15 unstable soils will constitute a major environmental
16 impact upon any new route constructed in the
17 Arctic regions.

18 Continuing studies are underway
19 on the impact on fisheries and wildlife and thus
20 far my observations are limited to the interaction
21 between construction crews and various species. I want
22 to make it very clear that these are limited to what
23 has been observed on this particular project. The
24 imposition of no hunting restrictions and rules in
25 the camps prohibiting guns being used by individuals
26 have eased this problem considerably. Long term
27 effects on widely ranging species such as caribou
28 have not been predicted as yet and of course a
29 considerable literature has developed around this subject.
30 Experience gained from studies in Lapland of the

1 effect of road systems on reindeer and in the Soviet
2 Union on the effect of pipelines and railroads on
3 reindeer plus our own knowledge of the effect of
4 road systems on caribou still leaves us somewhat
5 in the dark as to whether it is the system itself
6 in the case of roads bringing an expanded intrusion
7 of variables into such areas or whether it is the
8 road itself as a physical barrier that constitutes
9 the change in population and migration patterns.
10 There is always the chance that it may well be that
11 many of the things we witness would have occurred
12 in any case and this of course is the main unknown
13 factor.

14 The effect upon fish habitat
15 and fish populations has caused some concern. Strict
16 drainage control is necessary with the normal problems
17 of erosional siltation being magnified by the size of
18 the project. Practices which might be acceptable
19 if construction were being accomplished at a slower
20 pace thus spreading the siltation effect over a
21 longer period are simply unacceptable when compressed
22 into a tight time frame. The differences
23 are between a project delivering silt into a stream
24 over an eight year period as against a project of
25 this type which would be having its impact in a
26 one year period. It is difficult to get culverting
27 right on the first installation so that increased
28 stream flows will not inhibit fish migration
29 unless personnel skilled in such operations are
30 present. During our normal highway construction we

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1 have such personnel present, but on the project the
2 size of Alyeska, it has been impossible, a correction
3 needed there, to achieve the same level of expertise.
4 Culvert installation should allow time for changing
5 the installation before the fish migration occurs, if
6 a change in the installation should prove necessary.

7 Camp sanitation and water
8 treatment have become recurring problems. Were trained
9 personnel available to operate the new sophisticated
10 systems now in use most of these problems can be
11 overcome. The problem is essentially one of training
12 and having sufficient regulatory personnel on
13 board early in the project to assure that training
14 is accomplished.

15 Vapor releases in large
16 quantities can create micro climates which may
17 impact visibility in harbours and at airports. We have
18 had no practical experience in this as yet but
19 have identified it as a problem to be resolved
20 at the Valdez Terminal and at the pump stations
21 along the oil pipeline. Similar problems of course
22 will occur with the gas pipeline only these will
23 be magnified a great deal due to greater amount
24 of vapor release from such a line.

25 The first year of pipeline con-
26 struction largely consisted of building the haul
27 road and the camps and other support facilities
28 necessary to begin construction of the pipeline.
29 Obviously if these facilities can be utilized in
30 construction of any subsequent transportation systems

1 there will be significant savings in time and money.
2 In fact maximizing the use of existing facilities
3 is one of the key items in minimizing the environmental
4 impact of resource development. Everything that is
5 done in the Arctic and sub-Arctic in the way of
6 major construction normally requires inordinate
7 amounts of gravel. Anything that lessens this use
8 of gravel is an environmental plus. At the same
9 time in an energy short economy we must minimize the
10 investment in energy needed to extract energy
11 resources.

12 The greatest influence which
13 government can have in reaching a successful solu-
14 tion to energy transportation problems where there are
15 viable alternative solutions is to inject itself
16 very early into the decision making process. First
17 it must define what the government's goals are insofar
18 as both energy production and environmental protection
19 go. For example, the protection of marine and
20 fresh water systems is the prime environmental
21 concern for the oil pipeline. Maximum pipeline
22 integrity has been the watchword during design
23 review and now during construction. Integrity
24 in this particular area should be sacrificed to
25 other values only as a last resort. However, this pro-
26 blem will obviously be less with a gas pipeline
27 since the dangers of oil pollution will not ever
28 be present.

29 In my experience our main failure
30 in Alaska was not to develop earlier the type of

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1 surveillance organizations that we have now
2 at the federal and state level to plan the alternatives.
3 As stated earlier 'fundamental corridor decisions were
4 made before research in depth was accomplished.
5 Research in depth in this case need not mean a
6 lengthy drawn out data collection system. Rather it
7 means putting together a team of first class experts
8 in all fields who can correlate existing information,
9 make decisions on what further research is needed
10 and in co-operation with the private sector insure
11 that decisions on alternative routes are made
12 in the public interest. The difference between this
13 way and the way we accomplished it in reaching
14 decisions on the oil pipeline was that each agency
15 and department was handling a piece of the action
16 both at the federal and state level.. Some agencies
17 handled their sections superlatively well while others
18 reacted hardly at all to the problem. Major
19 transportation decisions require more of a focus
20 that can be given to them by this interagency inter-
21 departmental approach. When one considers the magni-
22 tude of the investment and the effect that such
23 investments will have upon this region for the
24 next several decades, it seems to me wise and prudent
25 to develop a first class organization to carry forward
26 the public's side early in the decision making
27 process.

28 I would say, Mr. Commissioner,
29 you are probably making further strides in this area
30 than we did in the past and we hope to match your

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1 efforts in the future.

2 THE COMMISSIONER: Thank you,
3 Mr. Parker.

4 MR. ANTHONY: Thank you,
5 Commissioner Parker. I would like to go back
6 to Dr. Weedon for a moment.

7 Dr. Weedon, has the State
8 of Alaska filed an official position with the
9 Federal Power Commission with respect to the question
10 of the pipeline route alternatives?

11 WITNESS WEEDON: A Yes, we have.

12 MR. ANTHONY: Mr. Commissioner,
13 I'd like to file with the Commission the statement
14 of position as filed with the Federal Power Commission
15 as an exhibit and I am going to ask Dr. Weedon
16 merely to summarize the environmental concerns
17 which pertain to the state's position as filed
18 therein, but the full statement in full will be
19 an exhibit.

20 THE COMMISSIONER: All right.

21 A The state of Alaska has
22 advocated a Trans-Alaska gas pipeline route which
23 makes use as much as possible of the existing Trans-
24 Alaska oil pipeline corridor. This is consistent
25 with the approach I have outlined for the various
26 Arctic Gas alternatives and consistent with the
27 approach for corridors outlined by Mr. Parker.

28 The much shorter Arctic Gas --
29 or Arctic Alaska Gas pipeline prime route into
30 Canada would export many of Alaska's concerns, environ-

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1 mental concerns outside of the state, but we are
2 extremely concerned still about the 200 or so miles
3 of pipeline which would traverse Alaska's land.
4 This 200 miles has not been touched up to now. It's
5 value as an intrinsic component of the Arctic National
6 Wildlife Range will be clear from my earlier testimony.
7 Essentially the state has taken the position that
8 such an intrusion upon an untouched area is irreversible
9 and tragic, whatever steps are taken to mitigate
10 its effects. It is further felt that such an intrusion
11 would run counter to established Congressional
12 policy as expressed in the Alaskan Native Claims
13 Settlement Act of preserving large parts of the
14 Alaskan wilderness from exploitation.

15 A major environmental benefit
16 of construction of a Trans-Alaska gas pipeline is
17 then the possibility of following the existing oil
18 pipeline corridor for much of the route. This
19 corridor has been intensively studied and conditions
20 relating to permafrost, vegetation, drainage and animal
21 habitat along it are well documented. Experience
22 gained through construction of the oil pipeline
23 would be invaluable in avoiding the stakes and
24 misjudgments that are otherwise bound to occur when
25 large construction projects are undertaken in a new
26 and relatively unstudied area of the Arctic and
27 sub-Arctic. Moreover, those impacts that cannot
28 be avoided regardless of the degree of care
29 exercised, such as damage to and intrusion upon
wildlife habitats will be only incremental to the

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1 effects already caused by the Alaska oil pipeline
2 in the case of a Trans-Alaska gas pipeline.
3 A Trans-Canada line, on the other hand would place
4 the full force of such unavoidable adverse
5 environmental effect on a new and unblemished region
6 of Alaska and Canada.

7 Construction along the
8 existing oil pipeline corridor could make use of
9 many of the Alyeska facilities such as camps, haul
10 roads, access roads, spoil disposal sites, storage
11 sites and similar facilities. The benefits from
12 such use would be large indeed from both an environ-
13 mental and economic perspective. To the extent that
14 the sharing of facilities is possible as in the case
15 of roads and airports and perhaps other facilities
16 as well, the aggregate effect of the oil and gas
17 pipelines is less than would be the case for a
18 Trans-Canada gas pipeline and a Trans-Alaska oil
19 pipeline.

20 The significance of the utiliza-
21 tion of existing Alyeska facilities is likely to be
22 even greater than a comparison of the two applications
23 might suggest. Arctic Gas proposes to use snow roads
24 and snow work pads for winter construction. El Paso
25 proposes to use the Alyeska haul road and state
26 highway, but also intends to work from the snow pad
27 for the actual laying of pipe.

28 In the state's opinion, neither
29 applicant has satisfactorily demonstrated the
30 feasibility of it's proposal in its application to

construct on the Arctic Coastal Plain. In that region precipitation is light, especially in the early part of the winter. Neither applicant has identified sources of water that will be utilized to make snow if there is insufficient snowfall nor have they identified alternative courses of action such as the use of gravel for roads and pads. This problem is more acute in the case of a Trans-Canada line since the use of snowroads and snow workpads entails a greater use of snow and also because the entire expanse of that line is on the Arctic Coastal Plain where the practicality of using snowroads is most questionable.

There are other environmental benefits of a Trans-Alaska line quite apart from the benefits associated with the use of the common corridor. Particularly important is the lesser damage a Trans-Alaska pipeline would cause to the fishery resources of the north. The Trans-Alaska route parallels the general north-south direction of flow of most Arctic streams that must be crossed. Since each stream crossing presents problems of siltation and erosion and the potential for ice damming caused by a chilled gas pipeline all of which are potentially destructive of Arctic fishery resources, the reduction in stream crossings is important.

Furthermore, the knowledge of the fishery resources in those areas that would be crossed by a Trans-Alaska line is far

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1 greater than is the knowledge concerning the
2 streams that would be crossed in Alaska and Canada
3 by any of the proposed trans-Canada pipelines.

4 MR. ANTHONY: Mr. Commissioner,
5 I propose not to go any further into the question
6 of statements, since the witnesses here concentrated
7 and are in a position to comment on the environmental
8 concerns and I am leaving it at that point. However,
9 I am obliged to ask Dr. Weedon, he used the word
10 cumulative effects which immediately put him into
11 good company -- or incremental effects -- in discussing
12 the utilization of the same general routing and we
13 have had discussions over the last number of days
14 about the synergistic or cumulative effect and I was
15 wondering if you could give us your opinion or
16 view of the argument that we have been having.

17 A Mr. Commissioner, in a
18 way I feel that biologists perhaps should argue this
19 point of synergistic effect out amongst themselves
20 to air our failings and lapses among our own group
21 before we bring it to the attention of august bodies
22 of lawyers and decision makers, but I might just
23 simply comment that the possibility of a synergistic
24 effect, seems to be based on a concept that an animal
25 or a population of animals has a threshold of
26 tolerance for stress and disturbance.

27 The first disturbance in this
28 instance, the first pipeline or road, may not reach
29 this threshold, the idea goes, but the second or
30 some subsequent one will exceed it with obvious and

1 perhaps disastrous effects. It would be the same
2 concept that some orientals were alleged to use in
3 devising the water torture where the first drop has
4 no apparent influence and maybe the millionth drop
5 sends the person over the edge into stark raving
6 madness.

7 I am sure that one could find
8 many examples that would fit this idea within the
9 whole field of biology. I am equally sure that one
10 could find at least as many instances of adaptation
11 or accomodation. I think in fact Dr. Geist used
12 the word, "habituation", where the first disturbance
13 causes by far the greatest reaction of any in a long
14 series as long as there isn't so great an interval
15 between these cases that the second case is to that
16 animal almost the same as the first experience.

17 I am also certain that weather
18 synergism or accomodation would apply to any given
19 arctic or boreal species as a matter of considerable
20 variation between species and certainly considerable
21 uncertainty among scientists.

22 We do know, however and I guess
23 I am saying that this synergistic effect is at this point a
24 very moot idea. We do know, however, that the first
25 major disturbance of wilderness character is by far
26 the most important and in fact irreversible in its
27 effects on the character of the land and this is our
28 point precisely with respect to a gas pipeline crossing
29 the Arctic National Wildlife Range.

30 Also, I think a point that has

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1 iterated perhaps enough in Mr. Parker's testimony and
2 mine, the intensive learning experience derived during
3 the construction of an Arctic road and pipeline
4 in new country such as with the case of the Alyeska
5 Pipeline reduces the uncertainties and risks of
6 environmental damage from later lines along the same
7 route.

8 MR. ANTHONY: Thank you, and
9 that is the evidence of this panel, Mr. Commissioner.

10 MR. GOUDGE: I wonder, sir,
11 if we might consider rising for five or ten minutes
12 perhaps for coffee.

13 THE COMMISSIONER: Yes, I think
14 we will and maybe you would speak to counsel about
15 the program for the rest of the afternoon and tomorrow
16 morning and speak to Commissioner Parker and Dr.
17 Weedon about whether there is any possibility of
18 their returning at any time that might be convenient
19 to them so as to accomodate Mr. Marshall and Mr.
20 Hollingworth if they wish to cross-examine and the
21 other participants.

22 There is another panel to be
23 heard after this one this afternoon?

24 MR. GOUDGE: I can perhaps
25 etter advise you, sir, after five or ten minutes.

26 THE COMMISSIONER: All right, well
27 we'll take a break and see what you can do.

28 (PREPARED TESTIMONY OF WALTER PARKER MARKED EXHIBIT 184)
29 ("ARCTIC TRANSPORT COSTS, THE MYTHS AND THE REALITIES",
30 WALTER PARKER, AUGUST 11, 1975, MARKED EXHIBIT 185)

1 (MULTIMODAL TRANSPORTATION AND UTILITY CORRIDOR SYSTEMS
2 IN ALASKA, OCTOBER 1974 AND NOVEMBER 1974 MARKED
3 EXHIBIT 186)

4 (STATEMENT OF POSITION OF THE STATE OF ALASKA MARKED
5 EXHIBIT 187)

6 (PROCEEDINGS ADJOURNED)

7 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

8 MR. GOUDGE: We will commence
9 with the cross-examination of this panel. Before
10 doing so I think its necessary to give you a brief
11 outline of my version at least of the next day and
12 next 24 hours perhaps, it is not version as to which
13 there is great agreement, I am afraid. If we commence
14 with cross-examination of this panel now, Mr.
15 Marshall, I think is the counsel who is prepared to
16 begin now. All counsel, I may say were very interested
17 in the evidence and all wished a chance to cross-
18 examine at some stage. I have spoken to both
19 Mr. Anthony and to the members of the panel and they've
20 indicated that there is every likelihood that at a
21 mutually convenient time we could entice them back
22 before you, sir, and cross-examination could then
23 be conducted at somewhat greater length. Mr. Marshall
24 tells me however, that he is very anxious to cross-
25 examine them both now. He feels he can perhaps
26 cross-examine Mr. Parker to the extent of his
27 existing questions between now and five o'clock and
28 I suggest that we get on with that.

29 As for Dr. Weedon, he is anxious
30 to cross-examine him as well. That perhaps could be

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1 done tomorrow morning. On the other hand, counsel
2 for the C.Y.I. has two witnesses that he would wish
3 to call tomorrow morning as well, so we have two
4 competing applicants for tomorrow morning's time
5 slot. I perhaps should let them speak for themselves
6 as to the reasons they want to fill that time slot
7 as they see fit.

8 MR. MARSHALL: Thank you,
9 Mr. Goudge. Sir, I think that I have a few minutes
10 questions, of questioning for Commissioner Parker
11 and it wouldn't take very long at all, so I see
12 no difficulty in accomodating his wish to be on the
13 next plane. It may be that after reviewing his
14 evidence with my advisors, my clients, there would
15 be a few other areas that I would want to explore, but
16 I doubt that very much. I think with Dr. Weedon's
17 evidence that there are a number of areas that I could
18 explore now and indeed I am anxious to do so. As
19 we all know there was quite a bit of meat in his
20 evidence and we'd like an opportunity to chew on
21 it and think about it and come back with a few other
22 thoughts and talk with him again, but I would like
23 an opportunity to put some questions to him, and
24 depending on how that goes it may be that we won't
25 need to have him back again, so I would think that
26 if we carry on with Commissioner Parker now, it's
27 not going to take very long and we could start with
28 Dr. Weedon this afternoon.

29 THE COMMISSIONER: Then let
30 the C.Y.I have tomorrow morning, is that agreeable?

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1 MR. MARSHALL: Well, if it is
2 possible, I'd like to carry on for awhile with Dr.
3 Weedon in the morning. It depends on how long
4 it's expected the C.Y.I. witnesses are going to
5 take. I gather there is a fish biologist and archae-
6 ologist.

7 THE COMMISSIONER: Well, how
8 long, Mr. Veale, did you want in the morning?
9 Did you want the whole morning? Is that necessary
10 or is it not?

11 MR. VEALE: I have one witness
12 to call tomorrow, and his evidence in chief would
13 not be very long, far less than an hour. There may
14 be some cross-examination, however. My position,
15 Mr. Commissioner is simply that I am very concerned
16 that he be on during this week. He's actually been
17 in Whitehorse since Monday waiting to be on. He has
18 advised me that he was going to be in Old Crow for
19 the month had it not been for the hearing coming to
20 Whitehorse, so I have strong feelings about that.

21 THE COMMISSIONER: Well --

22 MR. MARSHALL: Might we start
23 with him tomorrow morning? I anticipate, based on
24 the summary I have seen, that it's Professor Morlan's,
25 Dr. Morlan's evidence. I anticipate that I will have
26 very few questions. I seem to be the major bottleneck
27 when it comes to cross-examination.

28 THE COMMISSIONER: No, no, I
29 asked Mr. Veale because we are here in the Yukon and
30 I really wouldn't want the Council of Yukon Indians,

1 which is a Yukon organization -- I would like them
2 to have the opportunity to present all their evidence
3 while we are here and they are under constraints of
4 funding and so forth that may not altogether apply
5 to Arctic Gas, so I would like to give them a chance
6 to present their evidence while we are here.

7 MR. ANTHONY: If I may, I hope
8 not muddy the waters, but hope to solve a few of
9 our problems and I suggest perhaps that if it is
10 the view of counsel by five or five thirty or whenever
11 we are expecting to rise this afternoon, that Dr.
12 Weedon is to be, would like him to return. My
13 suggestion would be that we allow Dr. Weedon and
14 Mr. Parker both to leave on the same charter would
15 assist us in some financial as well as other problems,
16 but allow them to leave this evening and they will
17 both then return for examination at a subsequent
18 time. I say this not only for that consideration,
19 but because of the fact that we have also had Dr.
20 Hughs, who is to give evidence. His evidence is
21 a terrain analysis of the Yukon and I would be very
22 anxious that that evidence come in at Whitehorse
23 rather than at some subsequent time.

24 THE COMMISSIONER: Tomorrow
25 morning you mean?

26 MR. ANTHONY: Yes, and I would
27 think that with Dr. Hughs and the Council of
28 Yukon Indian witness we would probably take up
29 the morning and for that reason I suggest that perhaps
30 both the Alaska witnesses could leave this evening to

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1 be returned at a mutual convenient time.

2 THE COMMISSIONER: All right --

3 MR. BAYLY: Mr. Commissioner,
4 I am certainly willing to delay cross-examination
5 of these witnesses until they return at a later
6 time.

7 THE COMMISSIONER: I take
8 it you agree with Mr. Bayly, Mr. Bell?

9 MR. BELL: Yes, I stand with
10 Bayly on this.

11 THE COMMISSIONER: All right,
12 well, let's get started then. I take it you gentlemen
13 would like to leave on your charter this evening.
14 All right.

15 MR. MARSHALL: I have a feeling
16 they'd like to leave now, sir.

17 WITNESS WEEDON: Yes.

18 THE COMMISSIONER: Well, we
19 certainly will accomodate you because we do appreciate
20 the trouble you have taken to come, but perhaps
21 you'd bear with us for 45 minutes or thereabouts and --

22 WITNESS PARKER: Mr. Commissioner,
23 we are in no time bind. The charter won't be here until
24 7 o'clock.

25 MR. MARSHALL: I don't think
26 I'll take very long.

27 CROSS-EXAMINATION BY MR. MARSHALL:

28 Q Perhaps we could start
29 then with Commissioner Parker. I was wondering, sir,
30 whether in your discussion of the transportation corridors

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1 you had become previously acquainted with this concept
2 of synergistic impacts, synergistic effects.

3 WITNESS PARKER: A I've
4 become acquainted with it. I have encountered very
5 little to which one can really relate in actual
6 proof until you reach such a point where it becomes
7 obvious to where in effect you have built a corridor,
8 it is in effect a wall that is obviously a major
9 barrier to the movement of any other species, but
10 as far as, you know, reviewing anything where you
11 have a highway and you have another right-of-way,
12 a little bit of going , you know, what effect
13 this will have, I have never found anything that
14 I could crank into any kind of systems analysis
15 yet.

16 Q Well, in your role involved
17 in transportation planning, the establishment of
18 corridors and so on, is this anything that has been
19 studied by the State of Alaska or its consultants?

20 A The corridors, yes, have
21 received a good deal of study. We spent \$3 million
22 on a corridor study to the Arctic and to the
23 northwest four years ago, but this was a general
24 engineering study and feasibility study, it was
25 also entitled a corridor study.

26 Q Well, specifically I
27 was wondering whether in connection with these
28 studies there had been any consideration given as to
29 whether or not there might be a synergistic effect,
30 the impacts, or is this something that really

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1 just hasn't been looked at by the state?

2 A It has not received
3 really that much consideration and mainly because,
4 at least in my perception I at least have not
5 discovered existing literature that really approaches
6 the question and I have looked for it and neither
7 do I have the results of any tests in that particular
8 area. Certainly there have been many tests connected
9 with wildlife and simulated pipelines and that
10 sort of thing, but I am not aware of any tests where
11 any species -- there has been any real evaluation of
12 the effect of one road on a species as against
13 two roads on a species and so forth.

14 Q Thank you, sir.
15 Further on in page 6 you made mention that within
16 the Trans-Alaskan Pipeline right-of-way, the
17 actions of Alyeska are governed by lease agreement
18 between the Federal government and the members of
19 the Alyeska consortium. I was wondering, sir,
20 whether you knew if the agency had made any under-
21 taking to provide a gas pipeline easement in that
22 corridor?

23 A No, I have not received
24 any formal notification from the Bureau of Land
25 Management as to any gas line easement in that corridor.

26 Q Sir, further on in
27 pages 9 and 10 you speak about the service road that
28 Alyeska has constructed, the highway, you make mention
29 of the future intent that it be taken over by the
30 State of Alaska if I interpret it correctly, is that

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1 right?

2 A Yes.

3 Q Do I understand, sir,
4 that you have a concern about the cost of upkeep
5 of such a facility and you're interested in the
6 overall question of whether or not a transportation
7 facility serves some economic purpose that can
8 justify the expense in keeping it up?

9 A Yes, that is a very
10 great concern and certainly we will present to the
11 legislature when we budget eventually for such a
12 road, what the alternatives are and what the cost
13 alternatives are.

14 Q Has there been a
15 fairly substantial cost to the State in connection
16 with the upkeep of state roads as a result of the
17 Alyeska project?

18 A Oh, yes. Yes, we
19 have suffered a tremendous impact on the existing
20 state primary system, primarily as a result of pipeline
21 conditions and I testified before the Senate Public
22 Works Committee on July 31st to that effect to
23 some extent.

24 Q Yes, I understand --
25 THE COMMISSIONER: You
26 have a Senate in Alaska --

27 A This was before the
28 U.S. Senate.

29 THE COMMISSIONER: In
30 Washington.

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1 A Yes.

2 MR. MARSHALL: Q The

3 U.S. Senate Public Works Committee. I understand
4 that you were indicating an immediate need for some
5 \$70 million and a future need of some \$300 million --

6 A That is correct.

7 Q -- to allow upkeep. I
8 was wondering if from the construction of a gas
9 pipeline along that same corridor, you would expect
10 that there would be heavy impact on State highways.

11 A Yes, I would expect
12 that assuming an equal mobilization of equipment
13 over the highways it would be a continuing impact.
14 It is not anything on our highway situation, vis a
15 vis Alyeska impact, there's not anything that I can
16 go in and fix once and it will stay fixed. It just
17 requires a tremendously higher level of overall
18 maintenance and reconstruction on a continuing
19 basis and the same thing would occur with a
20 gas pipeline.

21 Q And I take it that
22 insofar as the State of Alaska is concerned, the
23 magnitude of this problem and the expense is consider-
24 ably greater if a future gas pipeline is to be built
25 in that corridor, rather than say in a shorter
26 195 mile road along the coast involving no permanent
27 roads.

28 A Well, what is important
29 is where the freight enters Alaska and where it is
30 mobilized. You know, I have seen no mobilization plans

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1 that would indicate how pipe would be brought in
2 particularly other than those directly associated
3 with the three ports in the staging along the coast,
4 but as far as any other impacts, no, we have not
5 seen those.

6
7 Well, sir, to give you a
8 fair answer to your question based upon the mobilization
9 plans that have been presented to us thus far, in
10 reference to the 195 mile construction across the
11 North Slope. If those plans were to be followed out,
12 why yes, it would -- probably the impact on the primary
13 highway would be substantially less, but I would have
14 to add the caveat that there would not be substantial
15 mobilization through the Gulf Coast ports about which
16 I knew nothing.

17
18 Q I don't know if
19 Alaska from the inside has it correctly, but they
20 were quoting you as saying that the Alaska road
21 system is being systematically reduced to rubble,
22 is that a fair comment?

23
24 A Yes, that is a fair
25 comment.

26
27 Q Sir, you made reference
28 at pages -- I think -- I've got a faint copy -- in
29 the teens, the early teens anyway of your evidence of
30 the corridors that's proposed by the Bureau of Land
31 Management in their preliminary conceptual analysis.
32 I was wondering, sir, if you could outline the
33 corridors proposed by the B.L.M. across the Wildlife
34 Range.

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1 THE COMMISSIONER: Across
2 the what?

3 MR. MARSHALL: Wildlife
4 Range.

5 A As far as I know.
6 There are several of them. I would have to refer to
7 the documents if you so desire. Did you want me to
8 identify those --

9 Q Can you just give me
10 a general description of them, sir?

11 A Well, the general
12 description is the one which essentially follows
13 the prime route. There is one along the coast and
14 then there is one which extends along the foothills
15 of the Brooks Range and then goes north and into
16 the Wildlife Range and then there is the existing
17 withdrawal around the south side which of course
18 doesn't enter the Wildlife Range.

19 Q Do I understand
20 correctly that the range is federal land?

21 A Oh, yes.

22 Q Sir, I believe it
23 is page 13 and I apologize, the page numbers on the
24 copy of your evidence I have didn't come through
25 too clearly. In any event, you made mention of
26 the initial selection of the route for the Trans-
27 Alaska Pipeline in the original withdrawal being
28 through the Anaktuvuk Pass.

29 A mm-hmm.

30 Q And that that was

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1 was found that it was not a satisfactory location
2 for a hot oil pipeline. Can you tell us what was
3 wrong with the Anaktuvuk Pass for those purposes?

4 A Well, my
5 own perception, the primary problems with the Anaktuvuk
6 Pass were the soils and hydrological conditions
7 in the pass itself which were generally poorer than
8 in Dietrich and also the problem of getting from the
9 northern end of Anaktuvuk Pass across all the
10 drainages between the Killik and Sag River. Those
11 areas are extremely deficient in gravel sources and
12 of course you are cutting across many stream drainages,
13 but primarily the really telling factor there was
14 the extreme deficiency of gravel sources in those
15 particular areas.

16 Q I understand from your
17 testimony that quite a bit of gravel was required
18 with the Alyeska haul road and the work pads.

19 A Yes.

20 Q Yes, so the line and
21 the corridor have gone to the Dietrich Pass further
22 to the east, is that so?

23 A The oil line, yes.

24 Q My understanding is
25 that that is a very narrow pass.

26 A Oh, yes.

27 Q Is it fair to say
28 that it might be difficult to accomodate a hot oil
29 pipeline and gas line through such a pass, given
the narrowness of it?

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1
2 A Yes, it's going to
3 present a substantial engineering problem, but
4 not one that is regarded as unfeasible, at least by
5 myself at this time. It is constructable, but it
6 is going to be difficult.

7 Q You would agree, I
8 suppose, sir, that there are very different engineering
9 considerations that apply to a hot oil line than
10 to a chilled gas pipeline.

11 A Oh, yes, totally
12 different.

13 Q Particularly soil
14 conditions that would be favoured by road locators
15 might vary considerably?

16 A Would you repeat that?

17 Q Well, particularly
18 the soil conditions through which the engineers might
19 locate a hot oil line as opposed to a chilled
20 gas pipeline might be totally different or very
21 different.

22 A Oh, yes, I don't
23 think that I can really comment on this at this
24 time because it's going to require a great deal more
25 analysis than I am prepared to come up with at
26 this time.

27 Q I see, well, we'll
28 leave it at that then, sir.

29 Sir, you dealt at some
30 length with the experience that has been gained in
monitoring the construction of the Alyeska project with

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1 respect to construction difficulties affecting the
2 various techniques and you talked about one of
3 the things that we have learned and this is on
4 leg 16, is that a major pipeline would probably
5 require continued adequate surface access from
6 mobilization of equipment, and you go on to mention
7 a good all weather gravel road. Sir, do you have
8 the same concerns with a system being constructed
9 wholly in the winter, using snow roads, do you
10 still have the concern for a good all weather gravel
11 road in such circumstances?

12 A We have an expressed
13 concern for the feasibility of snow roads. There's
14 two items here. One is the possibilities of
15 utilizing the work pad over which to mobilize large
16 amounts of equipment all at the same time using the
17 work pad for pipeline construction. Our experience
18 thus far with the Alyeska line indicates that this
19 would be extremely difficult. The other is of
20 course, if I understand your question correctly,
21 the feasibility of snow roads and also snow workpads,
22 is that correct, or just one or the other?

23 Q I am sorry, sir, I
24 was checking a point with Mr. Hemstock and I missed
25 your last comment. My apologies.

26 A Now, the other is --
27 the rest of your question as to the feasibility of
28 snow workpads and snow roads. Thus far based upon
29 our design review of the oil pipeline at which
30 snow roads and snow workpads received a great deal of

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1 consideration. We did not find them feasible for
2 that project except in a very minor use. The
3 problem is still being worked out. But in many of
4 the areas where first we hoped, very sincerely hoped
5 to be able to use snowpads, we were not able
6 to come up with a design which was suitable and
7 in those areas gravel is being utilized now, either
8 in the thin work pad concept or a normal one.

9 Q Sir, have you
10 been made aware of the research that has been carried
11 out through Northern Engineering Services in the
12 construction of snow and ice roads in northern Canada?
13 Specifically, there were tests conducted at Inuvik
14 about which there has been fairly extensive evidence
15 given before this Inquiry.

16 A Yes, the Department
17 of Highways has the snow road situation under
18 constant review and the Director of Planning in his
19 last submission to me to be forwarded to the
20 Governor for inclusion in our initial position
21 before the F.P.C. was essentially that the snow
22 road concept was not proven to our satisfaction.
23 So, I think the difference I want to make here is
24 the Department of Highways position which was
25 developed, does not have as much personal input
26 from me as did the position which was developed
27 at the pipeline office when I was directly involved
28 in the design review.

29 Q Yes, sir, but my point
30 of interest is to whether or not the State in reaching

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1 that position has taken into account the research
2 work done by Northern Engineering Services.

3 A It was made available
4 to us as part of the whole Gas Arctic submission.
5 We have reviewed it, I'm not sure whether we have
6 received it or not.

7 Q My instructions and
8 belief on having reviewed the application is that
9 the snow road test results in themselves are not
10 incorporated in the application, so I take it that
11 the state may not be available of these specific
12 studies.

13 A I guess the best answer
14 is not to my knowledge at this time.

15 Q Yes, sir, and it is
16 my understanding and correct me if I am wrong, there
17 is somewhat of a difference in the supply of the
18 logistics aspects on the Alyeska route than would
19 pertain, say, to construction of the applicant's,
20 Arctic Gas's, prime route, in that on the north
21 coast, for example, there are a variety of supply
22 points and it can be reached by barge and it is
23 not really necessary to bring up a haul load from
24 the south. Would agree that that makes a significant
25 difference in total volumes of traffic and so on?

26 A Yes, that would make
27 a total volume of a significant difference provided
28 that all the freight did come in by the barge and
29 that there wasn't a general shift due to the
30 presence of the existing haul road now.

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1 Q Just before leaving
2 this business of snow roads, sir, I was wondering
3 whether or not the state is aware of the research
4 work that has been done again by Northern Engineering
5 on techniques of snow accumulation for such areas
6 as the North Slope, and included with that, just
7 to give you a little more background, are snow
8 fencing, snow harvesting and snow manufacturing
9 techniques that have been developed in experiments
10 by Northern Engineering. Is the State aware of
11 those, sir?

12 A All of those
13 techniques were considered during the design review.
14 I again am not aware of whether we have the Northern
15 Engineering information or not. The Director of
16 Planning is very confident and has a wide range
17 of acquaintances. He usually gets copies of everything
18 pertinent, so I am not absolutely certain now
19 at this time.

20 THE COMMISSIONER: He
21 must be connected with Mr. Anthony's organization.

22 MR. MARSHALL: I am glad
23 you said it rather than I, sir, it's more likely
24 to be believed.

25
26 THE COMMISSIONER: Well,
27 let's pull ourselves together,

28 MR. MARSHALL: Q I understand
29 from your evidence, sir, that the major physical
30 problems in construction of the pipeline and haul road

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1 have related to soils conditions and river
2 crossings and those have been the major environmental
3 problems? This is paraphrasing your statement on page
4 18 of your direct evidence.

5 A They have been major
6 construction problems and major environmental problem
7 implies that there has been significant degradation.
8 I think that I would prefer to say that they have
9 just been environmental problems in the sense that
10 any erosional problem is an environmental problem.

11 Q In fairness to you,
12 sir, I should quote you. Quote: "The major physical
13 problems in construction of the present pipeline
14 haul road and therefore the major environmental
15 problems also, have been soils, conditions and
16 river crossings." End quote.

17 A Yes.

18 Q I am just wondering
19 sir, whether you thought that you agree with yourself.

20 A Okay. I think in the
21 way that you state it that they are identified as
22 major environmental problems. That does not mean
23 that there has been a major environmental impact
24 resulting from the problem because we have taken
25 steps to insure that this did not result.

26 Q Do I take it from
27 your comment then that there are satisfactory
28 techniques available to insure that notwithstanding
29 soil problems, soil conditions and difficulties
of crossing rivers, environmental impact can be

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1 minimized?

2 A Yes, that is the
3 secret of the whole business.

4 Q I suppose even so,
5 sir, even if these impacts can be minimized and
6 we have heard quite a bit of evidence so far in
7 this Inquiry about that sort of thing, I am not
8 going to argue with you about it. There still is
9 potential for impacts all along such a corridor
10 if a gas pipeline is built.

11 A Yes.

12 Q Unquestionable.

13 A Anywhere, you know,
14 unless your initial engineering is confident and
15 your field engineering is equally confident, well,
16 you can create a major environmental impact just
17 about anywhere along the route, even those areas
18 which were previously considered safe, such as the
19 areas of hard permafrost. I tried to indicate
20 in my testimony for the first time, we're opening
21 up a 400 mile trench traversing across Alaska and
22 we are learning a great, great deal from that
23 experience.

24 THE COMMISSIONER: When
25 you say a trench -- in the permafrost areas you
26 elevated it, did you -- I thought that the majority
27 of the line was to be elevated now, am I right --?

28 A Half the line is
29 elevated, half is below ground. Essentially the
30 line is elevated in those areas where you have unstable

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1 permafrost soils. In areas where you have permafrost
2 where it was considered to be frost stable, why
3 burial is going on, and there are constant adjustments
4 being made between below ground and above ground
5 because of course you can't bury your whole route
6 initially, it is not really feasible and you have
7 to be able to adjust to soil conditions as you
8 actually encounter them.

9 THE COMMISSIONER: So as
10 you encounter soil conditions in the field, it is not
11 just a question of crossing the river at, say,
12 100 feet downstream or upstream or avoiding one
13 or another natural obstruction. The very mode
14 of construction itself may have to be altered as
15 you proceed. That's been an enormous engineering
16 problem in the field, I take it.

17 A Yes, Mr. Commissioner,
18 you have to be ready for that eventuality in the
19 field. The design change manual is a very important
20 document and especially your back up, your technical
21 backup for your field crews is all important, you
22 can't maintain a high level of expertise with every
23 crew that's out there constructing. You have
24 to have them serve as trip wire so that when you
25 do run into problems you can bring in the highest
26 quality experts you can muster and put them on the
27 problem immediately, because from working in the
28 summer time in thaw unstable soils, sometimes you
29 don't have much time and you've got to react
30 quickly.

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MR. MARSHALL

Q Sir, I was wondering

in the monitoring programs that you have and the plans that are being developed, whether you -- whether they are quite specific to this particular right-of-way or whether or not studies and techniques that are being developed are such that would allow you to extrapolate to other areas?

A That is a thing that we are supporting a good deal of effort to now is extrapolation from this trench which is being cut laterally and seeing what kind of soil profiles we can come up. We have some hopes that we will be able to develop a much broader real soils map of Alaska as a result of this, but that is still in very formative stages.

Q Sir, just to pick up a loose end, and to make it clear to me, do I understand correctly that if a gas pipeline were to be built across Alaska as proposed by El Paso, that it would not terminate at Valdez?

A The El Paso proposal terminates presently at Gravina (?) Point which is south of Valdez.

Q How far is that, sir? How far is it from Gravina Point to Valdez?

A Approximately 40 miles.

Q Is this an area through which there is a corridor established and are there other transportation modes presently in it?

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1 A No, no corridor
2 by the State of Alaska.

3 THE COMMISSIONER: If El
4 Paso were given the right by the -- well, let
5 me put it this way, if there is an energy corridor
6 for the Alyeska line that largely consists of federal
7 land and it's partially state land too, I understand.
8 What would the procedure be to allow El Paso to
9 veer off toward its terminus? Would the Secretary
10 of the Interior have to act? How would that be done?
11 Are you in a position to tell me?

12 A You would have
13 two major entities that would be involved in that
14 decision, the State of Alaska and the Forest Service,
15 they are the two major land owners involved, and for
16 that particular portion of the line, why the applicant
17 would make a request for a right-of-way permit for
18 the state division of lands and to the same type
19 of application to the Forest Service using different
20 procedures in each case -- it would be a normal
21 right-of-way application.

22 THE COMMISSIONER: I see,
23 but let me go over on that subject. If an applicant
24 sought to use this Fairbanks route, or Fairbanks
25 Route or Fairbanks corridor to bring Prudhoe Bay
26 gas to the southern 48, at Big Delta they leave
27 the corridor, as I recall and head toward Whitehorse.
28 The landowners in their way lose stateowned land
29 on that --

30 A Mm-hmm.

1 Q By in large what are
2 they facing if they seek a right-of-way through
3 there? Are they facing any native land, Dr. Weedon?

4 WITNESS PARKER: I
5 believe they could find a way through without
6 land, but whether that would be the best technical
7 route is something else. I am not prepared to
8 comment on that. We haven't had enough background
9 yet.

10 WITNESS WEEDON: A Mr.
11 Commissioner, I might just say from my look at the
12 map, the majority of lands are state owned lands.
13 There is the Northway Tetlin Indian Reservation
14 which then is Indian lands, that appears to be
15 crossed by the present proposed alternative and there
16 are small other areas of lands available for native
17 selection, so there would be a question, I don't
18 think it would be possible to avoid all private,
19 that is, native lands in the area, and I would
20 presume then the usual procedures for obtaining a
21 right-of-way across private land would obtain in
22 that case.

23 Q Even though the
24 land is not yet held in fee simple by the Native
25 corporations -- Yes, Commissioner --

26 WITNESS PARKER: A This
27 is a reservation under the old style and so it is
28 held, whatever reservation lands are held, the
29 B.I.A. holds them in trust for the tribe I believe
30 is the simplest way of explaining it.

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1 THE COMMISSIONER: Yes,
2 thank you, thank you very much.

3 MR. MARSHALL: Q Sir, to
4 move on, you've commented on the effect upon fish
5 habitat and fish populations which you say have
6 caused some concern and you made reference to
7 problems of erosional siltation being magnified by
8 the size of the project. I take it you would have
9 the similar concern if a gas pipeline were built?

10 A Yes, we hopefully
11 would have a better set of stipulations to apply on
12 any gas or oil pipeline as a result of our present
13 experience, but if we're both concerned for the person
14 constructing it and for the State in the protection
15 of the environment --

16 Q Sir, have you found
17 that you are concerned both with respect to crossings
18 of water courses by pipelines and also pipelines
19 running parallel to water courses, particularly in
20 areas where there are steep slopes?

21 A Oh, yes, you know,
22 you have to have protection for both.

23 Q The corridor that
24 runs through Fairbanks, as I understand it does
25 contain quite a number of miles where the pipeline
26 would run in parallel with streams, is that not so?

27 A That is correct.

28 Q This is somewhat
29 in contrast with the situation on the North Slope
30 where the proposed Arctic Gas line would roughly

R.B. Weedon
W. Parker
Cross-Exam by Marshall

1 cross most of the streams which run from the higher
2 elevations down to the Arctic Coast?

3 A That is correct.

4 If you want me to expand on that, I think the difference
5 is in this case, talking about impacting one stream
6 as against impacting several, and the best means
7 of approaching that is that normally it is easier
8 to control erosion in the construction when you
9 are well away from the stream of course than when
10 you are working in or near the stream, but your
11 stipulations have to cover both cases. We have
12 encountered problems in both cases and will continue
13 to. I don't think you can reduce it, you know, to
14 make it quite as simple as the question indicates.

15 Q No, there is another
16 consideration too, isn't there, and that is that
17 if you are able to cross streams during the winter
18 time when many of them are frozen to the bottom,
19 problems of silt, so on, may not be as great as
20 they would be if you were doing the stream crossings
21 at other times of the year?

22 A Yes, that is why you
23 make them in the winter whenever possible.

24 Q Sir, on the 22nd
25 page of your prepared evidence you talked -- perhaps
26 I should quote you, you say, "Similar problems of
27 course will occur with the gas pipeline only
28 these will be magnified a great deal due to the
29 great amount of vapor released from such a line."
30 You are talking about the creation of micro climates

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W. Parker
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1 that might affect visibility at harbours and at
2 airports.

3 Sir, I was just wondering
4 what the basis of the statement was, as the magnification
5 of this problem with the gas pipeline? Do you have
6 some studies or data that you might refer to?

7 A Yes, a primary relation
8 there would be to Gas Arctic's own documents as
9 furnished to the State on project and to the environmen-
10 tal impact statement that the Interior just completed.
11 There is a problem in both cases.

12 Q Finally, sir, in
13 the last page -- you make this statement: "At the
14 same time in an energy short economy we must minimize
15 the investment in energy needed to extract energy
16 resources" I was just wondering, sir, whether the
17 basis of that statement, and given your considerable
18 experience in transportation planning and so on,
19 as a general principal as a transportation planner
20 you are interested in a system that can carry the
21 goods for the least overall cost and also in the
22 case of a system that uses fuel, one that is the
23 most efficient in the use of that fuel. Do you
24 accept those as valid principles in transportation
25 planning?

26 A Yes, I have always
27 accepted them as valid.

28 Q And would it follow
29 from that then, sir, that a system which in the
30 case of the Arctic Gas proposal, does not require

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W. Parker
Cross-Exam by Marshall

1 liqifaction and regasification and hence is more
2 efficient in its transportation from the source to
3 markets has certain advantages?

4 A Yes, it has that
5 particular advantage, of course, that advantage
6 must be weighed against all other energy inputs
7 either initially or on a continuing basis and
8 that is, you know, something that I don't think
9 I can answer in one simple answer.

10 Q. Excuse me just a
11 moment, sir. Sir, I noticed that you and Dr. Weedon
12 have with you the D.O.I. Environmental Impact
13 studies on the Arctic Gas proposal and there has been
14 some reference made to the support of the State of
15 Alaska to the El Paso proposal which is a competing
16 proposal. Do you know if there has ever been an
17 environmental impact study done by D.O.I. of the El
18 Paso proposal?

19 A Mr. Commissioner,
20 the state of Alaska has made it quite clear continually
21 in its statements which was read by Dr. Weedon in
22 support of the Trans-Alaska gas line. In no way it
23 is an endorsement of the specific El Paso proposal.
24 It is as a support of a Trans-Alaska gas line
25 for the reasons laid out in our submission to the
26 F.P.C.

27 Q Has the D.O.I. done
28 an environmental impact assessment of such a system?

29 A Not to my knowledge.

30 Q And does the state

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W. Parker
Cross-Exam by Marshall

1 support a system that would carry gas from where to
2 where?

3 A The state supports
4 a system which would carry gas from the North Slope
5 of Alaska to the United States utilizing a route
6 through Alaska which would serve the needs of
7 Alaska, both its economy and its social needs and
8 that in essence is why we made our decision for
9 a trans-Alaska route .

10 Q I notice that you
11 didn't make any reference to environmental impact
12 in that summation. I was wondering whether that
13 was just an oversight.

14 A I would include
15 environmental impact in that summation, Mr. Commissioner

16 Q Do I take it from
17 the lack of specificness in your description that
18 the state hasn't found such a route yet, that
19 your not able to give specific beginning and ending
20 points?

21 A The State of Alaska
22 is reserving its options at this time to comment
23 on the social, economic and environmental aspects
24 of both routes. We are endorsing a trans-Alaska
25 route which as Dr. Weedon pointed out and perhaps
26 you better read that again just so we get it
27 exactly correct, Bob, because I think it is critical.
28 The exact language in the F.P.C. statement.

29 MR. ANTHONY: A I think
30 perhaps, Mr. Commissioner, what we might suggest is that

R.B. Weedon

W. Parker

Cross-Exam by Marshall

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1 Mr. Marshall referred to the filing before the
2 F.P.C. which he has and has had and which is an
3 exhibit here and I think the policy has been clearly
4 stated by the witnesses and I think that they
5 have clearly stated they are not in the process
6 of selecting a pipeline route, they are adopting a
7 policy and I think that the policy has been expressed.

8 THE COMMISSIONER: Well,
9 I think, Commissioner Parker, that no one misunderstands
10 you except possibly Mr. Marshall, but I think that
11 has been straightened out. You aren't in any diffi-
12 culty, are you, Mr. Marshall?

13 MR. MARSHALL: It appeared
14 he was, sir. I thought it was a fairly straightforward
15 question and I didn't seem to be able to get a
16 very straightforward answer. I am content to leave
17 it.

18 THE COMMISSIONER: Well,
19 you asked whether there had been an environmental
20 impact statement carried out in relation to the
21 El Paso proposal. That is what got us off on this.

22 WITNESS WEEDON: A Mr.
23 Commissioner, may I comment?

24 THE COMMISSIONER: Yes.

25 A I think the State of
26 Alaska has determined that its interests, environmental
27 and economic and other interests are best served
28 by a line which goes across Alaska in a generally
29 north-south direction starting where the gas is in
30 Prudhoe Bay to some port and tidewater. We have also

1 determined that one of the major factors in this
2 conclusion is the ability to use an existing pipeline
3 and road corridor. However, we recognize that
4 several alternative southern termini -- good lord,
5 what is the plural of terminus? -- Termini will do,
6 are there. One could for example go over to Cook
7 Inlet, starting at Glenallen and diverting from the
8 existing Trans-Alaska oil pipeline right-of-way.
9 One could go to Valdez and compete for port space
10 with the oil terminal. One could go a little further
11 south. I am sure that there are several ports and
12 neither we nor any applicants or company that we know
13 of has satisfactorily worked out to the last degree
14 which of those particular precise routes would be
15 most important. As I say, we are just convinced
16 that a general principle should be that we should
17 use existing facilities as much as possible in the
18 construction of this gas pipeline.

19 Q Well, sir, in
20 reaching that conviction, have you been aided at
21 all by an environmental impact study that might
22 comment on the suitability of such a general route
23 as you have described?

24 A We have been aided
25 substantially by an environmental impact statement
26 that was done about 1971 on the Trans-Alaska oil
27 pipeline which describes in very, very great consider-
28 able detail that particular corridor and we are
29 hopeful that that document and its factual descriptions
30 will be useful for us for the majority portion of any

R.B. WeedonW. Parker

Cross-Exam by Marshall

1 trans-Alaska gas pipeline as well.

2 Q Do I take it then
3 that the State has not caused the work to go on
4 beyond that to assess the environmental impact
5 given the presence of a hot oil pipeline and with
6 a view to the addition of a gas pipeline?

7 WITNESS PARKER: A Yes,
8 we have, the fact that we have not formalized the
9 environmental impact statement is 1), because
10 there is no statutory requirement in the State that
11 we do this; 2) in a state with very slender resources
12 they are trying to maximize the research that
13 everyone else is doing. You must remember that in
14 dealing with the existing oil construction we are
15 also dealing with a substantial surge on the
16 outer continental shelf which we must monitor and
17 also this gas line problem. This does not detract
18 in any way from our devotion to working out the
19 best possible system for the State of Alaska, and
20 that is, as Dr. Weedon just stated it, a north-
21 south corridor with no particular defined termini
22 on the gulf coast as yet.

Neither are we committed
24 to the El Paso proposal per se. We have been quite
25 clear on that in all of our statements thus far.

26 Q Dr. Weedon has
27 given us considerable detail and assessment from
28 an environmental point of view of the acceptability
29 of various routes from the point of view of the
30 State of Alaska, and as I say on an environmental

R.B. WeedonW. Parker

Cross-Exam by Marshall

1 basis, and do I take it then that the assessment
2 that has been detailed has not been done with, as
3 a working tool, the separate environmental impact
4 analysis that would take into account the presence
5 and operation of a hot oil pipeline?

6 A I don't --

7 Q Well, perhaps I can
8 go back over it and explain it another way. As I
9 understood the presentation, Dr. Weedon was telling
10 us what the State of Alaska thought were the environmen-
11 tal consequences of the proposed prime route and the
12 various alternatives and he stated conclusions in
13 the state's position with respect to -- which
14 it considered to be the best from an environmental
15 point of view and the next best and so on. Do
16 I take it that in reaching those conclusions that
17 you have outlined, Dr. Weedon, you have not had
18 the benefit of an environmental impact study which
19 would take into account the presence of a hot oil
20 pipeline presently under construction by Alyeska?

21 WITNESS WEEDON: A That
22 is correct.

23 WITNESS PARKER: A Mr.
24 Commissioner, I think the critical thing to remember
25 in this instance is that what the state is advocating
26 and has presented as its position does follow a route
27 which has been, -- received a tremendous degree
28 of environmental study for 97% of that -- what will
29 probably be any eventual route and this is the
30 very critical factor which Dr. Weedon has stated

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Cross-Exam by Marshall

1 once which I think needs to be re-emphasized here.

2 Q Have the environmental --

3 WITNESS WEEDON: A If I
4 may comment here. I was responding to what I under-
5 stood as the technical point that the the Trans-
6 Alaska oil pipeline environmental impact statement
7 was not written with the idea of comparing that
8 environment if there were a gas pipeline there as
9 well, is that correct, is that the thrust of your --
10 so the oil line impact statement was done in the
11 absence of any assumption about a gas pipeline in
12 that corridor.

13 Q Well, from that
14 base there has been no additional work to carry on
15 the impact statement, to update it, if you like,
16 taking into account the reality of the hot oil pipeline.

17 THE COMMISSIONER: No,
18 Commissioner Parker said that the State, though under
19 no statutory obligation to do so, was continuing to
20 carry out work that had a bearing on that whole
21 question.

22 MR. MARSHALL: I was won-
23 dering whether or not the work that Commissioner
24 Parker is referring to has covered the leg that would
25 go beyond Valdez to Point Gravina.

26 WITNESS PARKER: A Mr.
27 Commissioner, no. I -- rather other commissioners,
28 I can muster at the time will be working on that the
29 first part of next week. We have given
30 some preliminary attention, however, there has not

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Cross-Exam by Marshall

1 been funding to get into it exhaustively. You can
2 be certain that the same sort of studies will be
3 conducted, will be required in Gravina Arm which
4 are state waters as will be required in the Valdez
5 Arm and the Gravina facility will certainly have
6 to meet stipulations equal to or better, and of
7 course adjusted for the fact that it would be an
8 L.N.G. facility to anything that is being built
9 at Valdez. The whole thing is that we have not
10 even accepted Gravina as the terminus as yet.

11 Q Have studies been
12 undertaken that would help you select what you had
13 considered to be the most suitable port for L.N.G.
14 plant.

15 MR. ANTHONY: Excuse me,
16 Mr. Commissioner, I haven't interrupted, but I
17 found this quite interesting as a matter of policy
18 and a method of proceeding, but I think now that
19 Mr. Marshall is really asking the State for its
20 assessment of a probable or a possible gas pipeline
21 route in Alaska that is completely outside the
22 purview of our concern as a specific. I think as a
23 matter of policy it is very valuable and I am
24 glad that we got into that. But when we are getting
25 into questions of what port are you going to study
26 and when are you going to study it and so on, with
27 respect to a proposal completely outside of any
28 alternatives that this hearing is concerned with --

29 THE COMMISSIONER: Yes,
30 I see the point. Surely I am not entitled to consider

R.B. Weedon
W. Parker
Cross-Exam by Marshall

1 the El Paso proposal, that is wholly within Alaska.
2 It hasn't been advanced here as an alternative and
3 if it had been, it is none of our business anyway,
4 except that in a same way that a pipeline wholly
5 within Canada is none of the business of the United
6 States, so --

7 MR. MARSHALL: I guess I
8 am led into these questions by the direct evidence
9 that has been presented and the position being
10 advanced in evidence by the State of Alaska in the
11 stated preference for certain routes and --

12 THE COMMISSIONER: They
13 don't want a pipeline across the north coast for
14 reasons that they've elucidated. As a matter of
15 policy they prefer a pipeline north and south if
16 one is to be built. But we are interested in their
17 reasons for rejecting the route along the north
18 coast and it is really none of our business why they
19 want one north and south, but anyway --

20 MR. MARSHALL: I intend
21 to leave it, sir. I think that those are all the
22 questions that I had.

23 MR. ANTHONY: Mr. Commissioner
24 before my friend leaves, I am wondering if he could
25 assist perhaps this panel. They are going to be re-
26 turning. Mr. Marshall very clearly stated there were
27 some studies done by Northern Engineering Services
28 on snow roads and asked the panel if they reviewed
29 it and they weren't aware if they had. I am wondering
30 if perhaps he could insure that these reports are

R.B. Weedon
W. Parker

1 provided to this panel so that when they return this
2 question can be canvassed with them further.

3 MR. MARSHALL: I am sure
4 the reports referred to can be sent on to these
5 gentlemen. I think Mr. Williams is here and I will
6 speak to him about that.

7 THE COMMISSIONER: Yes, well,
8 maybe they could even be given to them to read on
9 the plane home tonight.

10 MR. MARSHALL: We were able
11 to bring a lot of things with us, sir, but I am
12 afraid that we don't have those in our --

13 THE COMMISSIONER: Well,
14 I think that we will adjourn now, and --

15 MR. GOUDGE: Yes, I know,
16 sir, that it is after five o'clock and I suggest
17 that we adjourn the formal hearings at least until
18 9:30 tomorrow morning?

19 MR. MARSHALL: Sir, I
20 haven't questioned Dr. Weedon at all, do I understand
21 that we are adjourning now and you are having community
22 hearings this evening and that Dr. Weedon will not
23 be available tomorrow.

24 THE COMMISSIONER: Yes,
25 that is the position we are in, Mr. Marshall. Really,
26 I am sorry about that. This week has been full
27 of a great deal of evidence, all of it interesting
28 and all of it worthwhile, but we got ourselves into
29 a jam and I apologize to you, but the combination
of Scott and Goudge was more than we could cope with

R.B. Weedon
W. Parker

1 this week. They got us into this jam.

2
3 I would like to thank
4 Commissioner Parker and Dr. Weedon for coming because
5 I know that both of you gentlemen are very busy
6 public servants in your own state and I certainly
7 appreciate the fact that you have been good
8 enough to come. I would like you very much both
9 to come again at a time convenient to you and I would
10 be happy to see that all such arrangements are made
11 through the Inquiry and I should say that if there
12 is any additional expense entailed, the Inquiry will
13 bear that expense because we should have had this
14 week scheduled in a way that would have enabled us
15 to complete this evidence, and I hope that you
16 gentlemen, we cannot do any more than ask you to,
17 but when the time comes I hope that you will
18 give sympathetic consideration to returning and we'll
19 give you plenty-- Mr. Goudge will be in touch with
20 you and we will give you plenty of notice so that
21 a convenient time can be worked out.

22 So, thank you again, both
23 of you, and I do appreciate your coming.

24 WITNESS WEEDON : Thank
25 you very much.

26 WITNESS PARKER: Thank
27 you very much, we certainly will give it every con-
28 sideration.

29 THE COMMISSIONER: Fine,
30 thank you, sir.

31 (WITNESSES ASIDE)

1 MR. GOUDGE: 9:30 tomorrow

2 morning, sir?

3 THE COMMISSIONER: Well,

4 no, ten o'clock.

5
6 (PROCEEDINGS ADJOURNED)
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Mackenzie Valley pipeline inquiry:

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MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF AN APPLICATION BY CANADIAN ARCTIC
GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT
BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON
TERRITORY AND THE NORTHWEST TERRITORIES FOR THE
PURPOSE OF THE PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner

Whitehorse, Y.T.

August 15, 1975

PROCEEDINGS AT INQUIRY

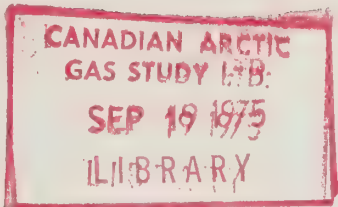
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Whitehorse, Y.T.

August 15, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. GOUDGE: Mr. Commissioner,

I wonder if we are ready to begin this morning.

Before we commence with this morning's panel, we were provided yesterday from Environment Canada with a report entitled "Biological Engineering Evaluation of the Proposed Pipeline Crossing Sites in Northern Yukon Territory. It's a relatively weighty report which we have and which we will no doubt be filing at a later stage and which the parties can certainly have access to if they'll speak to us. It's useful to note that for the record at this stage because we unfortunately haven't been able to hear from a specifically fish expert in this week's hearing although we may get that later on, but this report will deal in detail with that.

THE COMMISSIONER: The Secretary isn't here.

MR. GOUDGE: If you'd like it filed now, sir, I'll speak to the Secretary later this morning. Mr. Anthony has advised me that he and Mr. Veale are presenting the panel you see before you and I'll let him introduce them.

MR. MARSHALL: Sir, I wonder if I might make some remarks prior to the commencement of this evidence.

Mr. Commissioner, you will recall yesterday before the witnesses from the State

1 of Alaska spoke, I expressed my concern both about
2 the inadequate synopsis and also about the possibility
3 that I might not have an opportunity to cross-examine
4 them on completion of their testimony or at all.
5 The time available did allow me to cross-examine
6 Commissioner Parker, however, I was unable to turn
7 my attention to Dr. Weedon. For the moment, sir,
8 I must be and am content with the invitations that have
9 been extended to Dr. Weedon to return for cross-examin-
10 ation. I think though in fairness to Mr. Anthony,
11 I should, in keeping with the policy -- the mutual
12 policy of co-operativeness and reasonable notice
13 which I have been discussing with him this morning,
14 advise him that if for any reason Dr. Weedon is
15 not able to return, I will bringing an application to
16 have his evidence struck from the record of the Inquiry.

17 Sir, there is a second
18 matter that I would like to speak to very briefly.
19 It is my understanding that both Arctic Gas and
20 Foothills are entitled at the conclusion of each
21 phase of the Inquiry to call rebuttal evidence and I
22 take it that the same replies with respect to this
23 phase dealing with alternative corridors and my present
24 intention is to call rebuttal evidence at the end of
25 this phase whenever that might be.

26 However, sir, as I mentioned
27 yesterday, Dr. Banfield who has been on the panel and
28 who has been with us this week, is leaving next week
29 to Scotland on sabbatical leave. In view of the
30 uncertainties as to the date at which this phase on

1 alternative corridors might end and when rebuttal
2 evidence might be called, we wondered if Dr. Banfield
3 might be accommodated by being allowed time today
4 to give some evidence by way of rebuttal to that
5 that has been called by the other participants. I
6 should add, sir, that we fully intend to have Dr.
7 Banfield back in phase III dealing with environmental
8 matters, however, it would greatly convenience Dr.
9 Banfield if it were not necessary for him to make
10 the round trip from Edinburgh to Yellowknife twice
11 in the same winter.

12 Sir, if time could be
13 made available, I should think that about a half an
14 hour would probably suffice. That may not allow
15 time for the full and complete cross-examination
16 that all of the counsel are entitled to. As I men-
17 tioned, Dr. Banfield will be brought back and under
18 the circumstances I wondered if it might be possible
19 for him to make some remarks.

20 I understand, sir, and I
21 have had very little chance to go over this with
22 him, that he has a few words for the lawyers too,
23 so I am looking forward to hearing. Thank you,
24 sir.

25 THE COMMISSIONER: Well,
26 I think that we will certainly do our best to accommo-
27 date Dr. Banfield. Let's get on with this panel
28 and then we can get on with Dr. Banfield after that.
29 All right then, let's -- is this the only panel this
30 morning that you want to call, Mr. Anthony -- Mr. Veale?

O. Hughs
R.E. Morlan
In Chief

1 MR. ANTHONY: That is
2 correct.

3 THE COMMISSIONER: So it
4 would be just this panel and then Dr. Banfield this
5 morning. Fine.

6 MR. ANTHONY: Yes, Mr.
7 Commissioner, we thought it would assist and expedite
8 matters if we called both witnesses together --

9 THE COMMISSIONER: Certainly.

10 MR. ANTHONY: And then
11 provide time for cross-examination.

12 THE COMMISSIONER: Have they
13 been sworn?

14 MR. ANTHONY: No, they have
15 not. I was just going to --

16 OWEN HUGHS,
17 RICHARD E. MORLAN, sworn.

18 MR. ANTHONY: Mr. Commission-
19 er, the panel you see before you are Dr. Owen Hughs
20 who is attending at the request of Canadian Arctic
21 Resources Committee and Dr. Richard Morlan who is
22 attending at the request of the Council of Yukon
23 Indians and I will introduce Dr. Hughs and Mr.
24 Veale will introduce Dr. Morlan.

25 DIRECT EXAMINATION BY MR. ANTHONY:

26 Q Dr. Hughs, your
27 biographical note was circulated with your synopsis
28 of evidence and I will be filing that as an
29 exhibit and I wonder if you would just highlight
30 for the Commission your education and professional

O. Hughs
R.E. Morlan
In Chief

1 experience.

2 WITNESS HUGHS: A I was
3 born in Prince George, B.C. I graduated from the
4 University of British Columbia with a Bachelor of
5 Applied Science, Geological Engineering, 1950, a
6 PhD. in geology, University of Kansas in 1959.

7 Q I wonder if you
8 would perhaps assist us by explaining to us what is
9 a geological engineer as compared to a geologist.

10 A In training, at
11 least as it was at the University of British Columbia
12 in 1950, the geologic engineering candidates
13 took virtually the same courses as the geologists,
14 but in addition a number of courses in civil
15 engineering, mining engineering and metallurgy.

16 Q Do I understand then
17 that the training is directed towards an understanding
18 of the engineering consequences of certain types
19 of terrain as well as identification of the terrain
20 itself?

21 A Yes, that would be
22 fair to say.

23 Q And I understand
24 that you are a technical officer with the Geological
25 Survey of Canada and presently are a geologist and
26 research scientist in the terrain sciences division
27 of the Geological Survey of Canada and have been in
28 that position from 1959 up until and including the
29 present time?

A Correct.

Q And would you outline

O. Hughs
R.E. Morlan
In Chief

1 briefly your experience and particularly your
2 experiences in the Yukon Territory.

3 A Well, I have worked
4 in several of the provinces of Canada prior to
5 1960 and began working in the Yukon in 1960, mapping
6 surficial geology, the term we use, which is mapping
7 the unconsolidated deposits, the landforms and
8 studying the engineering properties of the material.
9 In 1969 my focus shifted more to the Northwest
10 Territories doing similar work along the pipeline
11 corridors.

12 Q I believe from 1969
13 to '73 you were involved with terrain evaluation
14 in the Mackenzie transportation corridor?

15 A That is correct.

16 Q I understand also
17 that you are a member of the Pipeline Application
18 Assessment Group that reviewed the application of
19 Canadian Arctic Gas?

20 A That is correct.

21 Q As a result of your
22 experience in the Yukon and the Mackenzie area of the
23 Northwest Territories you then have personal knowledge,
24 do you of the prime, interior and Fort Yukon and
25 Fairbanks proposed corridors?

26 A Yes, that is correct,
27 although I would qualify it a bit with respect to
28 the Fort Yukon corridor. My experience is limited
29 down in the southeastern part of the Yukon, especially
30 that part that involves the southern part of the Fort

1 Yukon corridor in Yukon.

2 MR. ANTHONY: Thank you.

3 Mr. Commissioner, Dr. Hughs has commenced his
4 evidence in a typed form and it will be filed as
5 an exhibit of this Inquiry. Unfortunately he was
6 absent and just completed it in handwritten form
7 prior to his appearance and therefore that section
8 will be typed and submitted as a total presentation.

9 Q Dr. Hughs, would
10 you outline, please, the major topographic features
11 of the Yukon and adjacent areas of the Northwest
12 Territories? And perhaps you could make use of
13 the slides that are available to you.

14 A Yes, I had some slides
15 that I have used in previous talks that will help
16 you, I think.

17 This will be a little
18 late for an overview, but -- are you hearing me all
19 right, or do I need the microphone?

20 THE COMMISSIONER: I think
21 you should use the mike, if you don't mind, Dr.
22 Hughs, so the people taking it down on tape won't
23 miss anything.

24 A This physiographic
25 map taken from a map by H.S. Bostock shows all of the
26 Yukon Territory and the western part of the District
27 of Mackenzie. We can start down here in the southwest
28 corner of the Yukon with the St. Elias Range which
29 is by far the most massive range in North America,
30 and immediately adjacent to it, the Shaskwak Trench

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1 it's a broad, very straight valley with a gently
2 undulating floor. Then to the northeast of that,
3 the Yukon Plateau stretching right from the Shakwak
4 Trench to the Mackenzie Mountains some 250 miles.
5 This is a bisected plateau consisting of, as
6 Bostock described it, as table lands, most of
7 them surmounted by mountains or mountain ranges,
8 and divided by a maze of broad valleys, broad
9 interconnecting valleys.

10 The Yukon Plateau is
11 bisected by the Tintina Trench, a feature very much
12 like the Shakwak Trench. And still further over
13 here we have the Selwyn Mountains, the Mackenzie
14 Mountains and the Ogilvie Mountains that bound
15 this eastern and northern part of the Yukon Plateau.
16 Going across the mountains we get into the Porcupine
17 Plateau. This is another region somewhat similar
18 to the Yukon Plateau, generally lower relief with
19 mountain ranges such as the Nahoni Range, the Keele
20 Range, the Old Crow Range, which is a range of
21 hills and a few higher peaks, -- and not shown here,
22 but should have been, the British Mountains, and
23 then on to the Coastal Plain which borders the
24 Beaufort Sea.

25 Within that same Porcupine
26 Plateau region we also have two extensive plains
27 areas, the Eagle Plain and the Old Crow Plain or
28 what is called Crow Flat. Then on the east of the
29 Porcupine Plateau, the Richardson Mountains which
30 are locally quite rugged in the northern part, but in

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1 the middle and southern parts, a fairly subdued
2 mountain range. That's bordered still further east
3 by the Peel Plateau which sits out in front of
4 the Mackenzie Mountains and the Richardson Mountains,
5 it narrows down at the north end of the Richardson
6 Mountains and at the north end of the Richardson
7 Mountains we go abruptly from the fairly steep mountain
8 front to the Mackenzie Delta. The Mackenzie Delta
9 consists of two fairly distinct parts. In this
10 region here is the modern Mackenzie Delta. This
11 is the alluvial silt that has been deposited at the
12 mouth of the Mackenzie River since the last glaciation.
13 It has a maze of lakes and distributary channels and
14 I think that everyone is quite familiar with that
15 part of the Mackenzie Delta. There is also an older
16 and more geologically complex area in this region
17 that in general terminologies included with the
18 Mackenzie Delta; whereas the modern Mackenzie Delta
19 has elevation from about 50 feet in the south and
20 grading to sealevel. This has elevations of anywhere
21 from 25 to perhaps 200 feet and it has no distributary
22 channels except the east channel of the Mackenzie
23 River, but it is dotted with hundreds of lakes.

24 Bordering the Peel
25 Plateau we have the Peel Plain and then on the
26 opposite side of the Mackenzie River, the Anderson
27 Plain. The Peel Plain is a relatively featureless
28 plain, the Anderson Plain is the same except that on
29 along this margin there are some prominent escarpments
30 and hills.

Going still further east we have the Colville Hills, Horton Plain, Great Bear Plain, and what is really an extension of the Peel Plain is the Mackenzie Plain, but it is differentiated out here because it becomes a relatively narrower feature. Between the Mackenzie Plain and the Great Bear Plain we have the Franklin Mountains, and these again are locally rugged, but in general low relief mountains.

10 Down in this corner, the
11 Great Slave Plain and way out to the east here,
12 the Canadian Shield. I won't say more about this
13 general region, I don't think, because this was
14 covered in an overview by Dr. Fyles.

15 Q Thank you, Dr.
16 Hughs, I wonder if you would now indicate these
17 major features on the topographic map which is
18 behind you on the wall and relate them to existing
19 potential transportation routes or corridors.

A The St. Elias

Range is this range in here going off into Alaska

The Shakwak Trench is this valley feature through

here with the Kluane Range, this lower range in

here on one side, Ruby Range on the other. It's

utilized by the Alaska Highway and also by the

Haines Road as it goes down through here. There

is also the products line that runs between Haines

and Fairbanks going along that same route.

29 This is the Yukon Plateau
30 in through here over to the Selwyn Mountains, and

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1 bisecting it is the Tintina Trench. Parts of
2 Klondike Highway and Campbell Highway lie within
3 that trench.

4 I spoke of a maze of
5 interconnecting valleys that splits up the plateau
6 into these table lands. Most of the highways in
7 the Yukon other than these I have mentioned follow
8 this interconnecting maze of valleys. The Alaska
9 Highway after it leaves Tintina Trench, follows the
10 Dezadeash, Takhini Valleys and then a system of
11 interconnecting valleys through into British Columbia.
12 So does the Klondike Highway going on its way up
13 to Dawson until it gets into the Tintina Trench,
14 follows along the Tintina Trench and then for a
15 short distance follows another valley over to
16 Dawson. The same is true of the road, the Mayo
17 Road leaving the Klondike Highway and going up to Keno
18 Hill. These roads very seldom follow one drainage
19 system continuously. They tend to jump from one
20 valley to the other and these are relatively broad
21 valleys allowing you to do that.

22 One exception is the
23 road that goes from Dawson across to Tetlin Junction
24 in Alaska. In this corner here we are in the un-
25 glaciated Yukon Plateau, the unglaciated part of the
26 Yukon Plateau. The valleys in this area tend to
27 have quite thick ice rich silts in the valley bottoms,
28 the valleys are confined, so that it has been found
29 that it is much better to climb up onto the ridges
30 and stick with the ridges.

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The Dempster Highway

follows Mountain Pass, one of many through the mountains to the O'gilvie Mountains and across into the Peel drainage. When it gets north of the Peel River it follows interconnecting ridges until it gets to the Richardson Mountains. This is somewhat analogous to the situation between Dawson and Tetlin Junction, the interconnecting ridges provide relatively stable terrain. Then it goes through locally confined terrain, through the Richardson Mountains, it's particularly confined in what is called the Gorge at the highest part of the route, onto the Peel Plateau, then onto Peel Plain and then follows the western edge of the Anderson Plain to Inuvik.

Q Would you describe for the Inquiry please, and perhaps in broad terms the terrain and soil conditions of these major topographic features.

A The terrain and soil conditions of the various areas are to a considerable degree the product of glacial history so if you will bear with me I will describe that briefly. This figure shows the southern and central parts of the Yukon. Just to get you oriented there is Kluane Lake, Whitehorse would be about here and Dawson up there. In central and southern Yukon there is evidence of at least three glaciations and the last of these ice spread from St. Elias Mountains in through here, and from the Selwyn Mountains over in

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1 here, and from the Cassiar Mountains to the south
2 to the limit shown by this very ragged boundary here,
3 that yellow line. . I am sorry that it isn't showing
4 up quite as well as I had hoped with these lights on,
5 but I think that perhaps you could see it.

6 This ice sheet was
7 actually the northern part of the Cordilleran ice
8 sheet that covered the whole interior plateau of
9 British Columbia. The ice margin was highly
10 irregular with tongues of ice extending along the
11 maze of valleys that I described earlier and pointed
12 out on the map here. In an earlier glaciation ice
13 had spread still further to the irregular red line
14 and in a still earlier glaciation to the green line
15 that you see here.

16 Local valley glaciers
17 occupied the valleys of the Ogilvie Mountains and
18 these loops that we see here are the terminal moraines
19 of the valley glaciers. But the northwestern part
20 of the Yukon Plateau including the Klondike District
21 was never glaciated. Much of Yukon Territory
22 north of Ogilvie Mountains is likewise unglaciated.

23 Now, here we switch
24 to further north and we're looking at -- here is the
25 Mackenzie Delta, the Richardson Mountains in here,
26 the Peel Plateau and Porcupine Plateau in here and
27 these are the Ogilvie Mountains down in this region.

28 The main Continental or
29 Laurentide ice sheet which covered virtually all of
30 Canada east to the Cordillera at its maximum extent,

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covered the Peel Plateau in here, the east flank of the Richardson Mountains, out around the north end of the Richardson Mountains and along the Yukon Coastal Plain about to Herschel Island. That's the mark by the green line on this slide and there was a late advance that brought the Continental ice sheet to this line after an intervening interglacial period. One feature of some interest here is that as the Laurentide ice sheet pushed in against the Mackenzie Mountains and the Richardson Mountains, it brought the drainage from this region and that drainage with meltwater from the ice sheet itself poured through a major valley that the melt water cut at the head of the Eagle River and through another channel at McDougall Pass and pushed drainage perhaps for the first time in geologic history westward out through the ramparts of the Porcupine River. Probably previous to that the drainage had been in this direction and that glacial meltwater laden with silt deposited quite thick glacial lake deposits along the Porcupine River, particularly in what we call Bluefish Basin and in Crow Flat and then there is another area not shown here in what's called Bell Basin at the north end of Eagle Plain.

Within the limits of the Cordilleran ice sheet and that is back south in the Yukon in the previous slide, the major valleys including Shaxwak Trench and Tintina Trench are mostly floored by coarse, textured, glacial till, and gravel, and gravel terraces extend down rivers such as Yukon, Pelly, Stewart,

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1 Klondike, beyond the glacial limits. The notable
2 exception is Takhini Valley from Whitehorse to
3 Haines Junction which is floored by fine grained
4 glacial lake sediments. There are other restricted
5 occurrences of these glacial lake sediments as in
6 the Aishihik Valley, Stewart Valley, for several
7 miles above Mayo, the north end of Teslin Lake
8 and a number of other localities.

9 Also, much of Tintina
10 Trench northwest of Dawson, and that is on the
11 Fort Yukon Route, is floored by shale, weak sandstone
12 and coal of tertiary age, and this part of the
13 trench is characterized by very large slides and
14 earthflows. The glaciated valleys of Ogilvie
15 Mountains are also generally floored by coarse
16 textured till and gravel in part overlain by peat
17 and ice rich silt. In the unglaciated Porcupine
18 Plateau, that is this region through here, then the
19 unglaciated Porcupine Plateau, surficial materials
20 are mainly the weathering products of the local
21 underlying bedrock, under typically in the silty
22 gravel range, but in areas underlain by shale of
23 Cretaceous age in parts of Eagle Plain the soils
24 are silty clays, and as I mentioned in the Old
25 Crow Plain, and this Bluefish Plain and in the
26 Bell Basin, there are extensive glacial lake
27 deposits. The glacial deposits within the limits
28 of Laurentide glaciation, that's to the east and
29 north of this green line, that is along the Mackenzie
30 Valley and Peel Plateau, on the east flank of the

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1 Richardson Mountains and along the Yukon Coastal
2 Plain are in general much finer grained than those
3 of the glaciated parts of central and southern Yukon.
4 The glacial till is typically clay sill or silty
5 clay with relatively low sand and gravel content,
6 and fine grained glacial lake sediments occur
7 along the axis of Mackenzie Valley with a few inter-
8 ruptions from upstream of Fort Simpson to the
9 Lower Ramparts of the Mackenzie. I can just show
10 that on a slide.

11 If you can distinguish
12 here between brown and purple on this slide, the
13 glacial lake deposits in the Mackenzie Valley go
14 along through here and here, through here, and
15 on up to here -- this is Fort Simpson here and this
16 takes us up to latitude 64. Again, the glacial
17 lake deposits are the purple and they continue along
18 the Mackenzie River in the Mackenzie Plain here,
19 along through -- with an interruption near the
20 Ramparts at Fort Good Hope, they are discontinuous
21 along through here, along Little Chicago, and in
22 at the upper end of the Lower Ramparts in the Mackenzie.

23 MR. ANTHONY: Mr. Commissioner
24 I believe that is the last of the slides, they will
25 be provided to the Commission so that they can be
26 copied and form part of the record.

27 Q Dr. Hughs, you
28 mentioned generally the coarse textured soils of
29 the central and southern Yukon as opposed to the
30 finer textured soils of the Mackenzie Valley. Would

1 you tell us please what the significance of this
2 is with respect to pipeline location and construction?

3 A Well, except for
4 central and southern Yukon and the southernmost
5 district of the Mackenzie which have only sporadic
6 permafrost, we are dealing with regions having
7 either continuous or discontinuous permafrost and
8 in general the coarse textured soils have significantly
9 lower ground ice content than fine textured soils,
10 at least until you get north of 68°30' where
11 the coarse textured soils too may have high ice
12 content. For this reason coarse textured soils
13 are less subject to slope failure or subsidence on
14 thawing. Either with or without ground ice, the
15 coarse textured soils are significantly less subject
16 to erosion by running water and hence present
17 significantly less potential for stream siltation.
18 Also, it is the fine textured soils, particularly
19 silt that are subject to ice segregation and frost
20 heave and present potential, and I say potential
21 engineering and environmental problems in the
22 discontinuous permafrost zone where the chilled
23 pipeline will cross unfrozen intervals.

24 Q Have studies been
25 conducted in the Yukon or the Northwest Territories
26 into an environmental and engineering hazards associated
27 with pipeline construction, that is, basically
28 hazards posed by terrain or soil conditions?

29 A Well, there have
30 been several types of studies. Now, I am talking here

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1 about studies outside that done by the two applicants ,
2 especially Canadian Arctic Gas which are very
3 extensive. The first terrain evaluation studies
4 were conducted by the terrain sciences division of
5 the Geological Survey of Canada in a broad belt
6 along Mackenzie Valley from the Alberta border
7 to Beaufort Sea including the coastal regions
8 east and west of the delta and the interior of
9 the northern Yukon to the Alaska border. These
10 studies involve classification of terrain at a
11 scale of one to 125,000. This is about two miles
12 to the inch. Soils comprising the various terrain
13 types were studied, including permafrost and
14 ground ice conditions. Studies were made of geomor-
15 phic processes, both natural and man induced in
16 order to evaluate the probable engineering behaviour
17 of soils in the various terrain types. Resulting
18 maps are available on open files of the Geological
19 Survey of Canada and the terrain evaluations were
20 published as reports 7336, 7337 and 7347 of the
21 environmental social program.

22 MR. ANTHONY: Mr. Commissioner
23 these reports will also be tabled and provided as
24 exhibits for this Inquiry. I believe we just have the
25 one with us today, but the other which is 7337, the
26 one that Dr. Hughs was particularly involved in and
27 the others will be filed subsequently.

28 A These maps formed
29 the basis for a series of what we call derivative
30 maps, called Terrain Classification and Sensitivity

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1 maps and these are also available on open files
2 of the Geological Survey of Canada. Another
3 type of study was more purely engineering in nature
4 dealing with physical and engineering properties of
5 permanently frozen soils and slope failures in
6 permafrost areas. These include studies by J.A.
7 Code, E.C. McRoberts and N.R. Morgenstern and by
8 R.M. Isaacs, and these are reports 7309, 7335 and
9 7416 of the Environmental Social Program.

10 Another type of study
11 concentrated on geomorphic processes, that is
12 changes occurring at present in the landscape whether
13 natural or man induced. These changes and their
14 causes were studied to predict what changes pipeline
15 construction might induce in the landscape and
16 also what hazards the changes might present to the
17 pipeline. Such studies included those by
18 J.A. Hagenbottom, P.J. Curfers, B.C. McDonald and
19 C.P. Lewis and these are reports 7316, 7324, 7339 of
20 the Environmental Social Program. Still another
21 type of study stresses the relationship of vegetation,
22 soil and permafrost. These included studies by
23 S.E. Zolti and W.W. Pedipeas, by Crampton Stang
24 by Kelich, Turniky, Bliss and another by Zolti
25 and Turniky and these are reports 7304, 7308,
26 and this will be -- I won't read these they will be in the
27 record, that I will provide.

28 Finally, there have been
29 numerous reports in scientific, engineering and
30 trade journals on the origin of permafrost and ground

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1 ice, problems of permafrost engineering, geomorphic
2 processes of permafrost areas and vegetation,
3 landform, permafrost relationships.

4 For central and
5 southern Yukon, there are published and unpublished
6 terrain studies for most of the region with a
7 notable exception of the southeast corner of the
8 Yukon that includes part of the Fort Yukon route.
9 None of these studies were conducted with a specific
10 problem of pipeline construction in mind. However,
11 by comparing terrain types one for one so far as
12 possible with those in the Mackenzie Valley, terrain
13 evaluation for pipeline purposes is possible, but
14 not everywhere or in the same detail as it has been
15 done for the Mackenzie Valley.

16 Q In the terrain
17 evaluation studies of the Mackenzie Valley were
18 certain terrain types identified as likely to present
19 engineering or environmental problems and if so
20 would you describe them and indicate the sort of
21 problems they may present?

22 A In Central Mackenzie
23 Valley where I had personal responsibility for
24 terrain evaluation, and for the southern part which
25 is closely similar and again for the northern
26 part which is less similar, but which we can relate
27 to what we are looking at the central area, we
28 identified at least four types of terrain that
29 were judged likely to present engineering and/or
30 environmental problems. One such type of terrain is

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1 glacial lake plains which are underlain by fine
2 grained soils, that is, silt and clay that were
3 deposited in glacial lakes at the close of the
4 last ice age. The soil of these plains is typically
5 ice rich, at least as far south as Fort Simpson.
6 A common feature of the plains are thermokarst
7 ponds and wet depressions which have resulted from
8 thawing of the ground ice and settlement of the
9 soil. Many of the ponds and depressions continue
10 to expand at the present, though relatively slowly.
11 Soil beneath the ponds and depressions and beneath
12 shallow interconnecting channels are unfrozen and
13 saturated with water. These sites provide the
14 main conditions for frost heave, that is, fine
15 grained soil and water, if they are crossed by
16 buried chilled pipeline and not all of them could
17 be avoided.

18 . Although the mechanism
19 by which the thermokarst ponds expand is not fully
20 understood, it appears likely that it would be
21 accelerated markedly if pipeline or other construction
22 raised water levels in the ponds. Further, where
23 tributaries of the Mackenzie River are cut into
24 such glacial lake plains, ice rich silt and clay
25 form the valley walls, and here the soils are
26 particularly susceptible to several different
27 kinds of slope failure.

28 . Organic deposits. This
29 is what is generally called muskeg which has thermo-
30 karst ponds or depressions and interconnecting

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channels, presents a similar potential for frost heave because the organic deposits typically overlie fine grained soil.. Indeed the very existence oftherokarst ponds indicates the former existence of ground ice that originated by ice segregation and hence susceptibility of the soil to ice segregation and frost heave. There is a potential for acceleration again of the ponds if construction disturbance raises water levels. But ~~these~~ deposits don't present slope stability problems because they occur on very gentle or flat surface, very gently sloping or flat surfaces.

Fine grained alluvial deposits. That is silt deposited by rivers and streams on their flood plains or deltas present closely similar problems if they have thermokarst ponds and depressions and interconnecting channels. Thermokarst alluvial silt prevails in most of the modern Mackenzie Delta and occurs locally in the flood plains of rivers and creeks within the region.

Rolling to hummocky moraine constitutes the third type of potentially troublesome terrain. This terrain type is formed of glacial till consisting of stoney silt and clay with irregular lenses of silt and gravel and having a rolling to hummocky surface with locally steep slopes. Depressions within the terrain unit contain ice rich silt and peat. In the subsurface there are large, very irregular and erratically

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distributed ice lenses. These conditions can lead to subsidence or to various kinds of slope failure if thawing follows surface disturbance.

Terrain consisting of colluvial deposits are also potentially troublesome. Colluvial deposits occur on slopes and are mixed deposits formed on slopes by creeping, sliding and slumping. colluvial soils in the Mackenzie Valley are commonly ice rich and therefore are subject to several kinds of slope failure. In the northern part of the Mackenzie corridor, particularly north of $68^{\circ}30'$ the surface deposits and hence the terrain types are geologically much more complex. In addition massive bodies of ground ice often many tens of feet thick are common and even coarse grained sediments may contain or be underlain by massive ground ice. Thermokarst depressions similar in origin to those occurring further south are common in many of the terrain types, that is, of this region north of $68^{\circ}30'$. The depressions and interconnecting channels are however, larger and deeper, commonly 25 to 75 feet deep as opposed to perhaps five to fifteen for the thermokarst depressions of the region further south. The depressions present some potential for frost heave and for accelerated thermokarst development due to construction disturbance. In addition, the sloping sides of the depression are subject to the various types of slope failures.

Q Now, would you describe please the relative extent and frequency of

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1 occurrence of these terrain types in the various
2 pipeline routes that are being considered by this
3 Inquiry.

4 A Well, there are
5 no mile by mile totals of the various terrain
6 types for the various routes. Available terrain
7 data for Fairbanks and Fort Yukon routes are much
8 less detailed than for the prime route so that
9 mile by mile totals that would be fairly representative
10 could not be prepared with what is known -- or the
11 available data base. I can, however, give relative
12 figures for the Fairbanks and prime routes for the
13 terrain types that I covered earlier and I believe
14 these to be, at least the general ratios to be
15 reasonably accurate.

16 The thermokarst alluvial
17 deposits occur only in short intervals of either
18 route and are of significant concern only for the
19 cross delta option which might have as much as
20 25 miles of these deposits. Glacial lake plains
21 are most prevalent on the prime route, particularly
22 if you take the interior alternate and marginally
23 less prevalent using the coastal option, and
24 they are significantly less on the Fairbanks route.

25 Rolling to hummocky moraine
26 is most prevalent on the coastal route, significantly
27 less on the interior route and still less on the
28 Fairbanks route. Thermokarst organic terrain is
29 about the same for the coastal and interior routes
30 and significantly less for the Fairbanks route. Colluvial

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1 slopes are most prevalent on the Fairbanks route,
2 less prevalent on the interior route, but still with
3 substantial intervals and almost lacking on the
4 prime route. I should emphasize that so far as
5 engineering problems are concerned, these are
6 potential problems and the degree to which the
7 potential might be realized depends very heavily
8 on the design and execution of the proposed project.

9 Severity of environmental
10 problems arising from terrain related problems
11 also depends very heavily on the design and execution
12 of the proposed project, but additionally, these
13 potential environmental problems should be weighted
14 to reflect large differences in the endangered
15 environmental values associated with the terrain
16 problems, depending upon where they occurred geographi-
17 cally. What I am saying here is that when you look
18 at the environmental problems that might arise from the
19 terrain disturbance, that it makes a great deal of
20 difference whether you are talking about terrain
21 disturbance adjacent to a valuable fish or other
22 resource or whether no similar valuable resource
23 has been identified at that point.

24 Q You mentioned also
25 that if one terrain type occurs, and the example,
26 the southern Yukon and also in the northern Yukon
27 or the Mackenzie Valley District, does this
28 necessarily pose the same type of engineering
29 and environmental problems in both areas?

30 A Not necessarily. The

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1 terrain type will have the same geological origin,
2 similar soil type and similar land form. That similar
3 soil type part needs some qualification particularly
4 with respect to glacial tills because they are
5 highly variable in character. They can range
6 from mainly silt and clay to mainly sand and
7 gravel, depending on what kinds of material the
8 ice sheets encountered as they ground across the
9 landscape. However, potential for engineering and
10 environmental problems depends additionally and
11 very critically on the distribution of permafrost
12 within the terrain types at a given locality, and
13 where there is permafrost the amount and distribution
14 of ground ice in the soil.

15 In descriptive legends
16 accompanying open file terrain maps, regional
17 differences in soil, permafrost and ground ice were
18 accomodated by dividing the region -- now, here I
19 am talking about the Mackenzie Valley where we had
20 mapping continuously from 60° to the Beaufort Sea.
21 For these regions we divided the whole region between
22 latitude 60° north and the Beaufort Sea into eight
23 zones and terrain types were then described for
24 each of the zones in which they occurred.

25 In northern Yukon and
26 Mackenzie Valley, the soils of the glacial lake
27 plains are typically ice rich, except beneath
28 thermokarst ponds and depressions. In the glacial
29 lake plain of Takhini Valley, there are no recorded
30 occurrences of ground ice, and ground ice must be

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1 generally, significantly less common in the
2 Takhini Valley, than say, in the Crow Flat. There,
3 glacial lake plains will pose only -- that is,
4 in the Takhini Valley, I would judge that glacial
5 lake plains will pose only conventional engineering
6 and environmental problems whereas in, for instance,
7 Crow Flat you would have the additional difficulty
8 of having these silts ice rich.

9 Q Dr. Hughs, could
10 you explain why there is ground ice in the soils
11 of the glacial lake plains as far south as Fort
12 Simpson in the Mackenzie Valley, but not in the
13 Takhini Valley in the Yukon when they are both
14 at about the same latitude.

15 A Well, I intended here
16 to have the permafrost map of Canada on the wall. I
17 will put it up when I am finished for those who
18 may wish to look at it.

19 Distribution of permafrost
20 depends upon a large number of interdependent factors ,
21 such as climate, vegetation, organic cover, winter
22 snow cover, hydrology, etc. The permafrost map
23 of Canada shows that Fort Simpson is within, although
24 only barely within the zone of widespread discontinuous
25 permafrost, whereas Takhini Valley is in zone
26 a zone termed southern fringe of permafrost, where
27 permafrost occurrences are sporadic and generally
28 fairly widespread.

29 Q Now, the question
30 of slope failures is one that has greatly interested

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1 this Inquiry. Would you described the types of
2 slope failures and their relationship to the
3 various terrain units?

4 A Well, by far the
5 most common type -- they have been called active
6 layer detachment slides or skin flows, and this
7 type of thin veneer of soil together with any over-
8 lying organic layer and the vegetation cover detach
9 from the underlying permafrost and slide down
10 slope. They may be a few tens to several hundreds of
11 feet wide and usually extend the full length of
12 the slope. They are most common on slopes underlain
13 by glacial lake deposits and on colluvial slopes,
14 particularly where the colluvium is underlain
15 by weak shale. They also occur on steeper slopes
16 -- on the steeper slopes within hummocky terrain,
17 hummocky moraine terrain type and on colluvial slopes
18 even where the colluvium is underlain by material
19 other than shale. They are commonly triggered by
20 forest fires which remove insulating organic cover,
21 but they may also be caused by human disturbance, of
22 sloping surfaces or by heavy rainfall. The actual
23 slide probably takes place in a few minutes. If the
24 soil exposed by the slide has little or no ground
25 ice, the scar will slowly revegetate. However, if
26 ice rich, fine grained soil is exposed, a retrogressive
27 thaw flow slide, also called bimodal flow and that's
28 less of a mouthful, may develop. In this type a
29 steep headwall develops and retreats by thawing
30 of the ice rich soil. The thawed soil flows away from

1 the headwall to form a gently sloping tongue of
2 mud.

3 Retrogressive thaw flow
4 slides may remain active for several decades and
5 become very large reaching a mile or more in length
6 and a mile in width. They reach their greatest
7 size in ice rich glacial lake clays, but they are
8 common in certain other units. They occur, for
9 instance in the rolling to hummocky moraine
10 terrain type that I mentioned and in the complex
11 glacial deposit of the older part of the Mackenzie
12 Delta and Yukon Coastal Plain. Another type of
13 failure ^{is} called rock slides, which involve movement
14 downward and outward of single large blocks of
15 soil without tilting and then if there is back
16 tilting as these slides occur, they are called
17 rotational slide, and there are examples of these
18 from the Northwest Territories and the Yukon that
19 look very much, very similar to examples from non-
20 permafrost areas and they are probably not strictly
21 permafrost related features.

22 These two types are
23 relatively uncommon, but a few examples occur in
24 glacial lake clays and in weak shales. Between these
25 retrogressive thaw flow slides on the one hand
26 and block and rotational slides on the other, there
27 is a complete range of intermediate forms in which
28 thawing of ice rich soil plays a role. These include
29 multiple regressive flows and multiple regressive
30 slides as defined by McRoberts. They occur in the

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1 same terrain types as the retrogressive thaw flow
2 slides.

3 Q From your observation
4 and study, Dr. Hughes, could you describe the
5 geographic occurrences and location of these various
6 types of slope failures along the various pipeline
7 routes we have been considering?

8 A Well, as I mentioned
9 a moment ago, the active layer detachment slides
10 are by far the most common type. They are found
11 along the length of Mackenzie Valley at least from
12 about Fort Simpson, along Bell, Porcupine and Old
13 Crow Rivers and their tributaries which, I am talking
14 now about along the interior route. There have
15 been no numerical inventories of these slides.
16 They seem to be significantly less common in coastal
17 regions with tundra vegetation than in the forested
18 regions to the south, but this may be due to the
19 absence of forest fires as a triggering mechanism
20 and it shouldn't be taken to indicate a lower poten-
21 tial for the slides following human disturbance.

22 In Peel Plateau they
23 occur on the valley walls ^{of} Stony and Vittrekwa
24 Rivers, but not on the actual Dempster Highway
25 alignment. However, there is potential for these
26 slides on the steep slope between Peel River and
27 the plateau surface. They are common on the
28 valley walls of the Eagle River above the Dempster
29 Highway crossing and there are scattered occurrences
30 adjacent to the route as you go through the Ogilvie

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1 Mountains. There are also scattered occurrences
2 in the unglaciated plateau in the vicinity of
3 Dawson. This is on the relatively deep, narrow --
4 on the sides of the relatively deep, narrow valleys
5 that I mentioned when I was talking about the
6 route from Dawson to Tetlin Junction. I am not
7 aware of any occurrences along Klondike Highway south
8 of Dawson or along the Alaska Highway, although I
9 dare say that it would be possible to turn up
10 some isolated example.

11 Retrogressive thaw flow
12 slides and the intermediate forms that I mentioned
13 a few minutes ago occur throughout the Mackenzie
14 Valley, the older part of the Mackenzie Delta and
15 along the Yukon Coastal Plains, and along Bell,
16 Porcupine and Old Crow Rivers. They occur in
17 Peel Plateau on the valley -- again on the valley
18 walls of Stony Creek and Vittrekwa River on
19 either side of the Dempster Highway route, in the
20 Richardson Mountains at the headwaters of the
21 Vittrekwa River, again near the Dempster Highway
22 route.

23 Q As a geological
24 engineer, what are the factors that you look for
25 to help you predict how the terrain will behave or
26 respond to construction activities?

27 A Well, observation
28 of soil type, permafrost and ground ice conditions,
29 landforms and hydrology all contribute to the assess-
30 ment. More important, however are observations of

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1 geomorphic processes such as water erosion, thermokarst
2 development and slope failures within various
3 terrain types. Even more valuable if they occur
4 in the region are engineering structures such as
5 highways, railways, pipelines, ditch systems, dams,
6 airfields, whatever. Communities with their roads,
7 water and sewage systems, building foundations,
8 all of which involve human impact on the terrain.
9 I should add to this list land clearing for agricul-
10 tural purposes, mining, especially placer mining
11 which involves man induced erosion and transportation
12 of soils. In general, linear features such as
13 highways, railways, pipelines and ditch systems
14 which cross a range of terrain types, are more
15 instructive than airfields, towns and farms which
16 commonly are located on a single terrain type
17 selected for its terrain stability. Now, you could
18 take Inuvik and its airport as good examples of
19 this sort of selection for very stable terrain
20 and you could take an example like Dawson City
21 which is a notable exception.

22 Q Would you comment on
23 the relative amount of engineering and other activities
24 that would assist you in predicting terrain behavior
25 along the various alternatives.

26 A Well, Yukon south
27 of Ogilvie Mountains, and I think Commissioner Smith
28 tended to emphasize this as an extensive system
29 of highways and roads, plus an operating railway
30 and extensive abandoned narrow gauge railways in

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1 Klondike District. There are three large operating
2 hydro plants, one on Yukon and another on Aishihik
3 and another on Mayo River, and the abandoned water
4 system described by Commissioner Smith that carried
5 water from Ogilvie Mountains to placer mines
6 in the Klondike region. There are a substantial
7 number of towns and settlements plus scattered
8 agricultural development which ranges anywhere from
9 the Shakwak Trench at least north to Dawson, and
10 then of course there are the extensive placer
11 mining, Klondike District, of course is well known,
12 I think it is less well known that there is extensive
13 placer mining right from Burwash and Gladstone
14 Creeks and Shakwak Trench north through to Dawson.
15 There is also extensive hard rock mining with both
16 underground and open pit mining. I should mention
17 also the abandoned Canol Pipeline in the presently
18 inactive Haines to Fairbanks products line.

19 Now, when we get within
20 the North of Ogilvie Mountains in the Yukon, there
21 is much less development. The proposed link of
22 the Mackenzie Delta to the Fairbanks and Fort Yukon
23 Route follows completed and proposed portions of
24 Dempster Highway. Perhaps as much as 60% of this
25 has been completed long enough to permit some
26 assessment of engineering and environmental problems
27 on the route. In the Mackenzie Valley there are
28 a number of communities and especially those like
29 Norman Wells and Inuvik have extensive facilities.
30 In these communities there were heavy structures that

1 were carefully designed and subsequently monitored
2 that have provided valuable tests of foundation
3 design. In addition there have been three test
4 pipeline facilities which we have heard about and
5 doubtless there will be more said about in the
6 hearing. These were specifically designed to
7 evaluate engineering problems of chilled gas pipelines
8 and hot oil pipelines and of course are particularly
9 useful for judging terrain behaviour. But construction
10 of segments of the Mackenzie and Dempster Highways
11 has also provided experience on the engineering
12 behaviour of certain terrain types, but in general,
13 linear structures, that is, the highways, the rail-
14 roads, the ditch systems and so forth that sample
15 a wide range of terrain types, there's just generally
16 too few in the Mackenzie Valley to provide adequate
17 experience with all of the terrain types that are
18 expected to pose problems. They sample some of them
19 but certainly not all of them.

20 Q Dr. Hughs, in your
21 opinion, would you now be in a position to provide
22 a detailed terrain comparison between the proposed
23 pipeline routes and the alternatives available?

24 A Certainly not a
25 detailed comparison. As I mentioned earlier,
26 terrain mapping has been completed in broad corridors
27 along the prime and interior routes at a scale of
28 about one inch equals two miles. The same type
29 of descriptive legend with allowance for regional
30 differences has been used throughout. Although the

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1 project was divided into three geographic areas,
2 there has been considerable co-operation and consulta-
3 tion between the personnel involved to insure
4 uniformity^{of}/treatment, and on the other hand
5 for the Fairbanks and Fort Yukon routes, at least
6 when we get south of 60° north, mapping scales
7 and legends accompanying the maps are quite variable
8 and the various studies were done without having
9 in mind the specific problems presented by pipeline
10 construction. The applicant has provided much
11 less terrain and geotechnical data for the Fairbanks
12 and Fort Yukon routes than for the prime and interior
13 -- alternate routes, and there is quite considerable
14 difference in detail to which the routes are shown,
15 so it is not certain at many points just what terrain
16 unit the route might be on.

17 So that, with such data
18 any kind of mile by mile comparison of the Fort Yukon
19 and Fairbanks route with the prime and alternate
20 routes just wouldn't be possible in my view.

21 Q Finally, Dr.
22 Hughs, could you perhaps assist us by giving us
23 your view as to what information or research you
24 feel would be helpful in making a proper detailed
25 terrain comparison of the alternate pipeline routes.

26 A Well, whenever people
27 ask me that type of question I always emphasize
28 the need for inventory rather than research and I
29 make a distinction between this, the inventory is
30 the adding up what's there. Now, such an inventory

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would involve terrain mapping along the Fairbanks and Fort Yukon corridors in much the same way that was done for the prime route, at least that would be my recommendation. Perhaps I am too enamoured of our own system, but I think that it provides a very useful basis for comparison. It is not enough, however, to divide the terrain into a number of terrain types, each terrain type should be characterized, by this I mean determining the range of soil types within each terrain type, the amount and distribution of permafrost and ground ice, the surface and subsurface drainage, etc. These factors together with observations of natural and man induced processes in each terrain unit would permit predictions of the probable impact of pipeline or other construction in each terrain type.

MR. ANTHONY: Thank you,
Dr. Hughs.

MR. VEALE: Would you
like a break now, Mr. Commissioner?

THE COMMISSIONER: Well,
let's carry on for awhile if that's all right --
if that's all right with Dr. Morlan.

MR. VEALE: Mr. Commissioner,
the curriculum vitae of Dr. Morlan has been made
an exhibit to the Inquiry and it is appended to the
question and answer evidence of Dr. Morlan
which we will go into shortly.

DIRECT EXAMINATION BY MR. VEALE:

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1 Q Dr. Morlan, I understand
2 that you graduated in 1964 with an honours B.A. in
3 anthropology, is that correct?

4 WITNESS MOPLAN: A That
5 is correct.

6 Q And in 1967 you
7 graduated with an M.A. in anthropology and in 1971
8 you completed your PhD in anthropology with a
9 specialty in archaeology.

10 A That is right.

11 Q I also understand
12 that since 1969 to the present date, you have been
13 the Yukon archaeologist with the National Museum
14 of Man in Ottawa.

15 A That is right.

16 Q Also appended to
17 your vitae are a number of publications and without
18 going through each one of them it appears that most
19 of them relate to the research work that you have
20 carried out in the Yukon Territory.

21 A The publications
22 listed here have been selected with that in mind.

23 Q There are others,
24 then?

25 A Yes..

26 Q Dr. Morlan, I also
27 understand that you have worked with Trans-Canada
28 pipeline and actually were the author of a proposal
29 on the feasibility of an archaeological salvage
30 project with respect to the Trans-Canada pipelines.

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1 A Yes, part of my task
2 was to outline a proposal and budget for the feasibility
3 studies that was sponsored jointly by the
4 Department of Indian Affairs and Northern Development
5 and the national museums of Canada .

6 Q I also understand
7 that you are a member of the Pipeline Assessment
8 Group related to this Inquiry.

9 A That is right.

10 Q Would you begin, Dr.
11 Morlan by indicating the importance of the study
12 of archaeology.

13 A If I may, I will
14 begin by clarifying one point about archaeology
15 in the Yukon with respects to its legal status
16 and how archaeological sites are protected. The
17 National Museum of Man has been declared as the sole
18 federal agency responsible for prehistoric archaeology
19 on federal Crown land. On the other hand the Territorial
20 Government of the Yukon Territory has jurisdiction
21 over all the Yukon archaeological sites through
22 the Archaeological Sites Regulations which form
23 a part of the Yukon Act.

24 Therefore, all archaeological
25 work in the Yukon is done under scientists and
26 explorer's permits which are issued by the Office
27 of the Commissioner. I wanted to clarify that
28 point to make clear my status as Yukon Archaeologist.
29 I am here on behalf of the Federal Government in
30 effect, but under the regulations of the Territorial

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1 Government.

2 Our reasons for studying
3 archaeology can be summarized very briefly. One of
4 them is simply because it is there, another is that
5 archaeology is our only means of reconstructing the
6 history of human groups that had no writing system
7 of their own, and archaeology along with various
8 other earth and life sciences can contribute to
9 our understanding of the relationship between
10 man and the natural environment through time.

11 Q Dr. Morlan, would
12 you indicate why archaeology is studied in the Yukon
13 Territory.

14 A The native people of
15 North America north of Mexico did not develop a
16 writing system of their own and their history
17 was first recorded by Europeans who gradually
18 colonized the continent between 1500 and 1900 A.D.
19 In the Yukon such records were made first in the
20 north by Alexander Hunter Murray in 1847, somewhat
21 later in the south beginning during the 1870's.
22 The long historical developments which preceeded
23 European contact and which have been shown to
24 extend back at least 30,000 years in Old Crow
25 Flats can only be studied through the techniques
26 of archaeological excavation and interpretation.
27 Yet this long history is an integral part of the
28 heritage of the Yukon Territory and its native
29 people. Its intrinsic value lies in its contribution
30 to our appreciation of the Yukon and the people who

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1 have lived here. In most areas of Canada, the
2 prehistoric record was erased by the last glacial
3 advance which reached its maximum about 18,000 to
4 20,000 years ago. Due to meteorological factors,
5 however, the interior of the Yukon and adjoining
6 areas of Alaska remained free of ice and the
7 record of prehistoric peoples and the environments in
8 which they lived remained intact and now provides
9 a unique opportunity for archaeological and
10 paleontological research. Only in this northwestern --

11 THE COMMISSIONER: Excuse
12 me, paleontological --

13 A The study of the
14 fossilized remains of living organisms.

15 THE COMMISSIONER: Thank
16 you.

17 A Only in this north-
18 western region of North America can we obtain a
19 complete record of human history in environments
20 characterized by tundra and boreal forest, and the
21 region affords our sole opportunity to investigate
22 the human adaptations which permitted the prehistoric
23 colonization of the New World.

24 Q Dr. Morlan, would
25 you tell us about the current status of Yukon
26 archaeology.

27 A Compared with more
28 southern latitudes where archaeological development --
29 or agricultural development, pardon me, has revealed
30 thousands of sites and has prompted a long history

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1 of archaeological research, Yukon archaeology is
2 still in its infancy. Approximately 400 prehistoric
3 and early historic sites have been located thus
4 far, but many of these sites consist of a small
5 scatter of flint flakes which can provide relatively
6 little information. Known sites which warrant
7 indefinite preservation or intensive excavation
8 probably number only a few dozen, depending on how
9 one classifies them. But it is all the more
10 important to protect those sites and to develop
11 measures for insuring that important sites which
12 are presently unknown will not be destroyed before
13 they can be properly studied.

14 The distribution of known
15 sites shows a strong logistic influence with most
16 of the northern ones being distributed along major
17 streams while those in the south are concentrated
18 along such roadways as the Alaska Highway and the
19 Aishihik Road. Such distributions do not necessarily
20 reflect patterns of prehistoric land use and can
21 therefore be quite misleading in studies of ancient
22 settlement patterns. What is needed is a comprehensive
23 survey of Yukon archaeology. But the pressures of
24 land use development and shortages of research funds
25 and manpower have conspired to channel more time
26 and money into salvage efforts with a corresponding
27 decrease in research oriented field work.

28 If I may, I will mention
29 several major projects currently underway which can
30 be taken as examples of the kind of work we need to

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clarify and to expand our knowledge of Yukon prehistory. The widespread researches of MacNeish and of Johnson and Raup in southwestern and central Yukon, are being followed up and expanded in a program sponsored by the National Museum of Man. This work involves new excavations at some of the more important sites located during the past thirty years and new surveys along the remainder of those streams and valleys visited previously on a rather spotty basis.

The Northern Yukon Research program supported by Canada Council and the University of Toronto and under the direction of Dr. William N. Irving, is focusing upon all aspects of prehistory and ethnography in the Old Crow region of northern Yukon. This project can be expected to contribute our most intensive understanding of the single region yet studied in the Territory.

The Yukon Refugium Project sponsored by the National Museums of Canada and the Geological Survey of Canada, is investigating the history of man and environment in the unglaciated areas of the Yukon with special emphasis on the Pleistocene epic. This project is devoted to an understanding of ancient ecosystems and one of its goals is the search for early human occupations in the Yukon.

THE COMMISSIONER: Dr. Morlan, forgive me again, Pleistocene epic?

A Epic -- a substitute

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1 word for period --

2 THE COMMISSIONER: No, no,
3 -- Peistocene, epic doesn't give me any trouble.

4 A Oh, Plietocene is
5 generally the ice age.

6 THE COMMISSIONER: All right,
7 fine, thank you.

8 MR. VFALE: O Dr.
9 Morlan, would you tell us about some of the major
10 findings of Yukon archaeology?

11 A Three areas of the
12 Yukon have been studied sufficiently to outline
13 regional prehistoric sequences extending back
14 several thousand years. The northern coastal area
15 has produced a record of at least the last 8,000
16 years, principally at the Enogsticiak site on Firth
17 River. Unfortunately this important site is too
18 badly disturbed by solifluction to provide a perfect
19 record, but it was clearly occupied by bison hunters
20 who seem to have been influenced by technological
21 developments on the Great Plains of the central
22 United States and who were followed by the ancestors
23 of the Inuit people who arrived in the area by
24 at least 5000 years ago. The Inuit people who live
25 in the area today provide continuity to a 5,000
26 year record of occupation there.

27 THE COMMISSIONER: Excuse
28 me, that site was how far from the mouth of the Firth
29 River?

30 A It is right at the

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1 edge of the coastal plain and the foothills of the
2 British Mountains and I am not certain in terms of
3 miles exactly how far that is.

4 THE COMMISSIONER: It is
5 the inner edge of the Coastal Plain, is that it?

6 A Pardon?

7 THE COMMISSIONER: The
8 inner edge of the Coastal Plain?

9 A Yes, that is right.

10 In the Old Crow area our earliest evidence has been
11 recovered in Old Crow Flats where human occupation
12 can be documented around 30,000 years ago. These
13 early peoples who may have been among the first
14 inhabitants of the New World hunted a wide variety
15 of animals in a steppe - tundra environment somewhat
16 more complex and somewhat richer than any habitat
17 presently found in the north. There is a long gap
18 in the known record of free history which begins
19 again around 10,000 years ago in that area. By
20 this time many of the big game animals were extinct
21 and only the bison and caribou remained as a stable
22 food supply for hunting communities. It is
23 not clear how many different cultures may have
24 lived in the Old Crow region during the next
25 8000 years, but it can be shown that the ancestors
26 of the Kuchin Indians were present there by at
27 least 2000 years ago. Their occupancy of the area
28 may be much more ancient than 2000 years, but we
29 are now able to trace their ancestry through a long
30 sequence of layers at the Klu-Kut site and the Old

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Chief site as well as others near Old Crow.

In the southwestern area of the Yukon our evidence comes primarily from the Kluane Lake area and the Aishihik Valley. Since these areas were covered by glacial ice until around 9000 years ago, our record of prehistory can begin only with the re-establishment of conditions suitable for human occupation.

Around 8,000 years ago a group of people with a distinctive microblade technology appeared in the area and seemed to have lived there for at least 2,000 years. Whether they moved elsewhere or whether their technology gradually changed is not yet clear, but the assemblages of artifacts are rather different beginning around 6,000 years ago. From this time onward to the historic period we can trace the development and history of the Tutchone Indians and their relatives in southwestern Yukon.

MR. VEALE: Q Dr. Morlan, you mentioned microblade technology. Would you explain that?

A Microblade technology consists of rather elaborate handling of lithic raw materials, stone material, in which a core of this material is prepared in a special way and then long slender, parallel sided slivers of stone are removed from it by applying pressure to the edge of the stone. These slivers are useful for making all sorts of handy cutting implements, apparently in

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1 some cases they were hafted on a piece of wood or
2 a bone and in some cases they were inset in the
3 edge of a bone projectile point where the sharp
4 cutting edge of stone stuck out beyond the bone
5 centre and formed a very effective piercing instrument.
6 It is simply because the microblade production
7 blade sequence is so complex that it represents a
8 significant hallmark for tracing certain kinds of
9 technology around the world and we don't know
10 exactly who the people were in this case who made
11 these microblades, but they represent a very distinc-
12 tive distribution from central Alaska down into the
13 southern part of the B.C. plateau and a portion of
14 the distribution is in the Yukon.

Q Would you
continue with your evidence.

A Archaeological work
and paleontological work in the Yukon have been
increasingly integrated since the discovery of
fossilized bone artifacts in the Old Crow Flats.
Through this integration we hope to discover not
only how the climate and environment have changed
through time, but also what has been the role of
man in such changes. Such broad questions can
take many more years of work to answer, but
certain general patterns are already apparent.
During the late upper Pleistocene around 20,000 to
30,000 years ago, much of the interior of the
Yukon and Alaska was characterized by a kind of
tundra rather different than that we see today.

In someways it was a richer tundra, for it certainly many more kinds of large herding herbivorous animals than now exist in this region. For example, the fossilized bones of mammoth, mastodon, camel, a giant elk, Saiga antelope, several kinds of horse, bison, muskox, sheep, and caribou as well as a few others have been found in deposits dating to between 20,000 and 30,000 years ago in this region.

For some reason or reasons not yet entirely clear, nearly all of these animals became extinct by 10,000 years ago. The bison persisted for awhile, but it too disappeared and the only large, herding herbivours remaining today in significant numbers are the caribou and sheep. In this sense we can characterize the present ecosystem of Interior Yukon as a much simpler one than 20,000 years ago. The importance of this observation rests with the fact that only the caribou now converts the plants of forest and tundra to a significant food supply for man. Without the caribou, much of the plant cover of the Yukon coast and interior would be rendered useless to man as a source of food.

We must also investigate the possible role of man in the late Pleistocene extinction. We cannot demonstrate in my opinion that man was solely responsible for the disappearance for such a wide variety of animals, but man may have tipped the balance to some extent at a time when

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climatic changes were so widespread and so significant as to eliminate a continental ice sheet. Whether or not man was involved in the extinction of the mammoth and its contemporaries, our perspective of 30,000 years should prompt us to exercise every precaution lest we endanger the last remaining large herding herbivores in northwestern North America.

Q Dr. Morlan, would you outline the archaeological implications of a pipeline across the Yukon.

A Many kinds of land use developments including the construction of the ditched pipeline can be seen as a double edged sword from the standpoint of archaeology. On the one hand the ditch and the many ancillary facilities such as roads, borrow pits, air strips, and wharves may destroy archaeological sites and the information they contain.

On the other hand such construction activities may reveal previously unknown sites which can be studied quickly in the context of a salvage operation and which might otherwise never be discovered. The latter edge of the sword should not be taken to indicate complaisance on the part of the archaeological community, because such construction activities provide a poor environment in which to carry out a proper study of sites in their stratigraphic contexts. Nonetheless, archaeologists will seek every opportunity to maintain constant surveillance

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1 of such major land use operations in an effort
2 to salvage as much information as possible.
3 Preliminary surveys have been and will be designed
4 to reduce the number of occasions on which archaeological
5 work must be done under the pressure of a
6 salvage and construction schedule.

7
8 Q Dr. Morlan, would
9 you now tell us about the implications of various
10 proposed and possible routes through the Yukon
11 Territories.

12 A The Yukon portion
13 of the prime or coastal route crosses the Firth
14 River in the immediate vicinity of the major
15 concentration of archaeological sites which were
16 discovered and studied by R.S. McNeish in the
17 1950's. The most important of these is the
18 Endicott site which certainly requires further
19 study due to its complex soliflucted stratigraphy.
20 Endicott lies outside the likely area of ditching
21 activity and its associated traffic lanes, but
22 it is situated on an abrupt promontory which could
23 invite casual use as a vantage point or a permanent
24 use for certain kinds of facilities such as
25 communications towers or borrow pits. This site
26 should be strictly off limits for all pipeline
27 related activity and several other sites in the
28 vicinity should be protected. The Firth River
29 crossing would avoid this concentration of sites
30 if it were relocated toward the north. Other sensi-
31 tive areas include the crossings of the Malcolm

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1 River and Rapid Creek where nearby surveys have been
2 successful in locating important sites. In addition
3 the location of wharves along the coast could
4 have an important influence on the archaeological
5 impact of this route. It is quite likely that
6 previously unknown sites will be encountered in
7 the ditch along the prime route and archaeologists
8 should have an opportunity to examine such finds
9 before the ditch is filled.

Needless to say, this
discussion of the Yukon portion of the prime route
applies also to the offshore Corridor.

Q Dr. Morlan, just to
take you back for a minute, you mentioned the
Engistciak site has a complex soliflucted strati-
graphy. Could you explain what that is?

A Yes, solifluction
is a form of downslope movement which in that
environment on the Coastal Plain can occur in
slopes as low as 3° -- is that accurate?

WITNESS HUGHS: A Quite
possible.

WITNESS MORLAN: A Quite
possibly 3°. The top of this promontory is fairly
flat to the observer standing on it and looking
across the land and yet the very, very slight slope
on this nearly flat surface has caused the active
layer of the soil to move downward and literally
fold over on itself. This means that cutting a
slice through the stratigraphy on the site, the over

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1 turn solifluction loads which literally form complete
2 loops in some cases permit you to encounter the
3 same stratigraphic unit, the same layer, three
4 times in a single vertical hole. The first encounter
5 will be right side up, the second encounter is
6 upside down, the third encounter is right side up
7 again, and that is just if there is one lobe. It
8 can be more complex than that.

9 The techniques available
10 at the time, in the field of archaeology generally,
11 at the time that McNeish conducted his excavations
12 in the early 1950's, did not in my opinion provide
13 an adequate excavation of the site. McNeish
14 did the best he could given the knowledge we had at
15 the time. Hopefully we have techniques now that would
16 permit us to evaluate stratigraphic units in such
17 a complexly disturbed site and make sense out of the
18 sequence of cultures that lived there.

19 O Dr. Morlan, would
20 you now turn to the Interior Route and the
21 archaeological implications of that route?

22 A The Interior Route
23 through the Old Crow area passes within 2,000
24 feet of at least 11 known archaeological sites
25 in the Yukon. Other important sites are so situated
26 as to be vulnerable to road construction. For
27 example, the very important site of Klo-Kut was
28 disturbed quite badly by the construction of a
29 winter road to Old Crow in the winter of 1969 -70.
30 The road not only crossed the site, but also ran

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along it parallel to the Porcupine River for a distance of nearly 1,000 feet. Over this entire distance and across a width of some 30 feet, approximately 400 years of the prehistoric and early historic record was removed by a single path of a bulldozer. The site was not totally destroyed, by any means, but further losses should be avoided at all cost. Heavy use of this road would be likely for the staging of pipe materials to Spread A, and the road should be located about four miles downstream before swinging north along the east bank of the Old Crow River.

The entire confluency of the Old Crow and Porcupine Rivers is especially productive in terms of archaeology and nearly all the sites can be directly related to the prehistory of the Vunta-Kutchin Indians who live in Old Crow today.

A second critical area is in the vicinity of Rat Indian Creek where an important site somewhat similar to Klo-Kut is located in a prominent clearing on the Porcupine River bank within a mile of the proposed route. This clearing might well invite temporary road construction, but it should be protected from any such activity. Similar protection should be afforded the site at La Pierre House, and an unnamed site on the Pat River about seven miles west of the crest of the Richardson Mountains.

It should be apparent from

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1 what I have said that the Interior route poses
2 a threat to more known sites than does the
3 prime route, but this difference may be related
4 to the more intensive history of archaeological
5 work in the interior than along the coast and
6 probably does not reflect an actual difference in
7 the density of prehistoric occupation along the
8 two routes.

9 Previously unknown sites
10 will undoubtedly be encountered during construction
11 of a pipeline and its related facilities along
12 the interior route and the Northern Yukon Research
13 Program and the Yukon Refugium Project should be
14 consulted as current sources of information on
15 new site locations.

16 Q Would you now
17 relate the implications for the Fort Yukon Corridor.

18 A The Fort Yukon
19 Corridor has been examined as a possible alternative
20 to the prime and interior routes, but has not
21 been given route status. The Prudhoe Bay supply
22 line would enter the Yukon Territory just north
23 of the Yukon River and would follow the Klondike
24 and Campbell Highways to Watson Lake from which
25 it would follow the Alaska Highway. The exact
26 threat to known archaeological sites cannot be
27 evaluated at this time since precise route maps
28 have not been available to me. Surveys along the
29 Klondike Highway have been productive and approximately
30 30 known sites are located primarily at stream crossings

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1 along that route. The Campbell Highway has not
2 yet been surveyed for archaeological sites, but
3 the areas around such major lakes as Simpson,
4 Francis and Finlayson are expected to be
5 productive.

6 Q Would you now
7 turn to the Fairbanks corridor.

8 A In the Fairbanks
9 corridor the Prudhoe Bay supply line would generally
10 follow the Alaska Highway throughout its length in
11 the Yukon. Such a corridor would presumably make
12 use of land which has already been so intensively
13 impacted that significant threats to archeological
14 sites might not arise. Many sites have already
15 been destroyed through construction along the
16 highway, and only a few remaining intact sites
17 of unusual importance would have to be avoided.
18 Should the exact route within the corridor be
19 placed on land not heretofor subjected to intensive
20 land use, however, a detailed archaeological survey
21 would be warranted since our knowledge of sites in
22 this area are so closely based upon highway recon-
23 naissance. The Fairbanks and Fort Yukon corridors
24 share a proposed alignment for the Mackenzie supply
25 line along the Dempster Highway which runs northward
26 through the north Klondike Valley and across the
27 Peel Plateau to cross the Richardson Mountains in
28 an easterly direction south of Fort MacPherson.
29 The road then proceeds east to Arctic Red River to
30 form a junction with the road to Inuvik. Preliminary

1 surveys both during and since construction on
2 various segments of this highway have been quite
3 productive and further intensive reconnaissance
4 is definitely warranted.

5 In particular one
6 can site the prominent sandstone ridges on the Peel
7 Plateau which served as natural highways in
8 prehistoric times. Such features have already
9 invited the Dempster right-of-way and would
10 doubtless serve as both alignment and borrow
11 sources for a ditched pipeline. The Fairbanks
12 corridor would entail a continuation of the
13 Mackenzie supply line along the Klondike Highway
14 which has been surveyed for archaeology with
15 preliminary, but productive results.

16 In summary, we should
17 note the significance of former glaciation as a
18 factor in assessing the potential impact of various
19 proposed routes and corridors. On the one hand
20 glacial advances destroyed all previous records
21 in some areas, while on the other, certain kinds
22 of glacial and bedrock features comprise prehistoric
23 highways in more recent times and such features
24 are archaeologically productive.

25 In unglaciated areas
26 which comprise nearly two-thirds of interior Yukon
27 there exists the possibility of discovering deeply
28 buried sites of great antiquity which could rank
29 among the most important finds in New World
30 archaeology. While a ditched pipeline project might

reveal such sites, we must always remember that the ditcher is not exactly a delicate instrument compared with the archaeologist's trowl and paintbrush. The process of discovery could also be a means of destruction for many of the small sites which characterize the north, and the pipeline may for that reason hold more threat than promise.

From the standpoint of Yukon archaeology, the Fairbanks corridor seems to present the least threat to the prehistoric heritage of the territory. This is partially because the Prudhoe Bay lateral would pass through glaciated terrain in which any deeply buried sites of great antiquity have already been removed by glacial ice. If the pipeline were constructed on land already impacted for other purposes, the threat to sites would diminish considerably. The Prudhoe Bay lateral in the Fort Yukon corridor likewise is situated in glaciated terrain along about 2/3 of its length in the Yukon and presumably would be situated on land already disturbed by highway construction. The unglaciated portion of the route would require careful survey during construction since the opportunity would exist to encounter deeply buried sites of great antiquity. In the case of the interior and prime routes, this factor characterizes the Yukon portion of each. It is difficult to choose between these two routes from the standpoint of archaeology since the history of research is not

the same in the two areas, but many more known sites occur along the interior route than along the prime route and the chances of finding deeply buried sites of great antiquity are probably much greater in the Interior than on the coast where bedrock is often covered by a thin mantle of soliflucted fine sediments.

Returning for a moment to our last remaining large herding herbivores, it is worthy of note that the large and healthy Porcupine caribou herd could be adversely affected by either the prime route or the interior route both of which cross the normal migratory path of these animals. The Fort Yukon and Fairbanks corridors could entirely avoid this danger, although the Mackenzie supply line along the Dempster Highway might add any disturbance already posed by road construction. The principles guiding the protection of prehistoric sites seem entirely consistent with those required to protect the principle food animal of late prehistoric times.

MR. VEALE: Thank
you, Dr. Morlan.

THE COMMISSIONER: Well, thank you, Dr. Hughs and Dr. Morlan. I think that we will break for coffee now and during the coffee break, Mr. Goudge, would you consult with counsel and see if they can agree on how we should use the time that we have between now and one o'clock?

MR. GOUDGE: Yes, sir.

(RESUME OF DR. HUGHS MARKED EXHIBIT 188)
(SUMMARY OF EVIDENCE OF DR. HUGHS MARKED EXHIBIT 189)

O. Hughs
R.E. Morlan
In Chief

(RESUME OF DR. MORLAN MARKED EXHIBIT 190)
(SUMMARY OF EVIDENCE OF DR. MORLAN MARKED EXHIBIT 191)

(PROCEEDINGS ADJOURNED)
(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: We'll

take our seats now, ladies and gentlemen.

MR. GOUDGE: Well, sir, I talked to counsel at the break and I think I have a relatively shaky consensus to present to you, sir, and that is that I advised counsel that the panel before them, Dr. Hughs and Dr. Morlan will be back before you, sir, as our witnesses. We intend to call them at a later stage, I think as part of Phase I, but if not in Phase I in Phase II. They will then be appearing in their personal capacities as they are today. They will then be available to be cross-examined by all counsel, both on the evidence they have given today and on the evidence that they will give as our witnesses. On hearing that I think my friends are content that they be permitted to step down today and Dr. Banfield be permitted to be recalled by the applicant Arctic Gas in the particular circumstances that he faces, namely that he will be leaving the country very shortly to go to Scotland and if he were not permitted to get back up now, it might mean two return trips from Scotland rather than one.

THE COMMISSIONER: All right, we are glad that counsel are able to agree and I want to thank you, Dr. Hughs, and you, Dr. Morlan for giving us a very interesting morning and we will look forward to your reappearance. I suppose

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1 it will be at Yellowknife and then the gentlemen
2 here will have a chance to question you about these
3 matters, so thank you again.

4 MR. VEALE: Mr. Commissioner,
5 if I might just make a comment. Would these gentlemen
6 appear on the routing evidence which may come in at
7 another time. That may be important to me particularly
8 because I don't necessarily attend all the sessions
9 in Yellowknife.

10 THE COMMISSIONER: Yes, well,
11 we'll bear that in mind then. In fact I am going
12 to ask Mr. Scott and Mr. Goudge to convene a meeting
13 of counsel at the earliest convenience of all counsel
14 to discuss the scheduling into the fall and winter
15 of the Inquiry's work and to discuss as well the
16 order in which evidence should now be heard in view
17 of the referral of the Foothills application to the
18 Inquiry, in view of the questions that have been
19 raised here this week in relation to the Fairbanks
20 route, proposed route, and other matters that counsel
21 would no doubt wish to consider among themselves,
22 so we will ask Mr. Scott and Mr. Goudge to convene
23 such a meeting early on and they're aware as we
24 all are that you can't attend in Yellowknife except
25 when it is vital to the interest of your clients
26 and that will continue to be observed.

27 MR. VEALE: Thank you,
28 sir.

29 THE COMMISSIONER: So, thank
30 you again.

1 (WITNESSES ASIDE)

2 THE COMMISSIONER: Dr.

3 Banfield.

4 ALEXANDER WILLIAM FRANCIS
5 BANFIELD,
6 resumed

7 MR. MARSHALL: Dr. Banfield,
8 I understand that you have some comments to make
9 with respect to some of the evidence that has been
10 led this week by other participants.

11 A Yes, sir. Thank you,
12 Mr. Commissioner. Mr. Marshall asked me if I would
13 present some sort of rebuttal evidence in connection
14 with Dr. Weedon's testimony yesterday and I pointed
15 out that such a very important and detailed statement
16 really needed much study, detailed study with the
17 facility of a library in order to effectively discuss
18 Dr. Weedon's testimony, but I was willing to present
19 a first, sort of very general overview, that had
20 been my responsibility with the applicant, Arctic
21 Gas, particularly in connection with the alternate
22 corridors.

23 As has been pointed out
24 previously, we face a tremendous handicap in not
25 having received Dr. Weedon's testimony before it
26 was in fact delivered and I chose to listen rather
27 than to read and so in fact I didn't examine it until
28 after it was delivered and one of the points is in
29 listening to his testimony I find that he departed
30 from his text at a couple of points which I will
discuss.

1 I can then just briefly go
2 through the first few pages with ^{some} general comments, and
3 these are general comments and starting on page
4 3, of course, a very important question as to what
5 criteria he used to base his judgments upon and I
6 notice that the basic criteria is his critical concerns
7 and this is one of my concerns about this hearing
8 has been that of course this is what is really given major
9 prominence in the whole hearing process is people's
10 critical concerns or their concerns about the develop-
11 ment and quite often these concerns are given in a
12 very broad overview sort of language, completely
13 unsubstantiated with documentation and as he
14 mentions, based primarily on a familiarity with the
15 area.

16 On page 4 specifically,
17 there is a discussion on the establishment of
18 new air and transportation in Alaska where none
19 now exists and this is the idea of the Arctic Coast
20 and I merely indicate that a lot of this is
21 questionable, there are in fact DEW line establish-
22 ments all along the coast and they are being
23 serviced somehow and it is my understanding by
24 air.

25 THE COMMISSIONER : I have
26 visited at least one of them by air.

27 A Thank you, sir.
28 Yes, sir, I too, on a couple of occasions in which
29 I found that I was an unwelcomed guest by air.

30 THE COMMISSIONER: I wasn't

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1 a guest, I didn't even invite myself in. I just
2 looked through the fence. Carry on.

3 A They tend to be
4 unfriendly inside the fence, I find.

5 Well, I am particularly
6 concerned about Dr. Weedon's overview with reference
7 to the importance of this project on caribou. If
8 one reads his conclusions, he in fact, he reports
9 it to be worst case conditions, I am reading
10 directly, "...worst, case conditions would result in
11 severe losses of the Porcupine herd" and this turns
12 out to be really his most conservative estimate,
13 at various times he has --

14 THE COMMISSIONER: What
15 page is this, sir?

16 A It is on page 5,
17 I believe. But it is really the first time that
18 I have been able to address a phrase which has
19 become quite prominent in this hearing, and that
20 is worst case prediction based on some sort of
21 methodology and I'd like to point out, sir, that
22 worst case prediction is a legitimate type of
23 treatment and it is usually based on some probability
24 and the first time I encountered it was in reading
25 the Environmental Impact Assessment of the Alyeska
26 pipeline and as everyone well remembers the U.S.
27 Coast Guard in fact made a worst case prediction as
28 to the number of oil spills that might occur, the
29 amount of oil spills, the number of collisions that
30 might occur on a worst case prediction system.

1 But legitimately worst case is related to risk
2 prediction and this is based on statistics. There
3 have been enough details on sea transport in which
4 one can predict from statistics, forecast the occurrence
5 of oil spills, one can forecast the occurrence of
6 air disasters on so many million miles. One
7 even forecasts the probable occurrence of earthquakes
8 and this is quite common and I am sure most of
9 us are familiar with the Richter scale, and it is
10 based primarily on past statistics.

11 This type of research is
12 in fact used in land use planning, certainly ever
13 since the Winnipeg flood, for instance and
14 Hurricane Hazel in Toronto, such worst case statistics
15 as the fifty year flood level have become part of
16 community planning which prohibits construction of
17 homes on flood plains, for instance. I am trying
18 to indicate what is a legitimate use of worst case
19 planning, worst case prediction. But really, sir,
20 the whole description here of the probable effects
21 on the Porcupine caribou herd is not worst case
22 example, ^{It's in fact} the Doomsday scenario. It is the Doomsday
23 scenario, ^{of} what would happen to the Porcupine caribou
24 at a time interval Armageddon or since Armageddon
25 isn't on the Yukon map, something more reasonable
26 would be the predictions, say, of an atomic or
27 nuclear bomb blast. It is a difficult subject,
28 sir, and I am sure that we will have more detailed
29 discussion at a later date on worst case prediction.

30 The use of the Arctic

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1 Wildlife Range has been dealt with at a great
2 extent here. I understood him to say, actually
3 that the encouraged industrial development which
4 he foresaw would pre-empt the use of the Arctic
5 Wildlife Range as for the inclusion of a research
6 natural area in order to monitor industrial development
7 elsewhere, and a great deal has been written and
8 a great deal has been said about the unique values
9 of the range. It's hard to be objective in this
10 area on the exhibit which he demonstrated on the range
11 there are at least three tundra ecosystems which
12 are distributed from the international boundary right
13 around to the Bering Sea coast and if one inspects
14 the range in detail on the map you'll see that the
15 areas in fact interdigitate across the pipeline
16 so that damage to the pipeline in fact would not,
17 if damage were caused by the pipeline, it would not
18 remove sizeable areas of those particular tundra
19 ecosystems to be used for control studies.

20 Another point which I
21 was quite concerned about was his evidence in connection
22 with polar bear den sites. This brings up a point
23 that I will discuss at the end of my summary. Dr.
24 Weedon quoted me at E.P.B., sir. He took the time
25 to quote my concerns about the impact of the proposed
26 interior route on the Porcupine caribou herd. At
27 the same time he chose not to quote another witness,
28 Mr. Roseneau, who in fact gave a great detailed
29 report on the status of polar bears along the Arctic
30 Wildlife Range coast.

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1 MR. MARSHALL: Excuse
2 me, Dr. Banfield. This was evidence given before
3 the Federal Power Commission?

4 A Yes, sir, evidence
5 given before the Federal Power Commission.

6 THE COMMISSIONER: How
7 do you spell that name, Roseneau?

8 A R.O.S.E.N.E.A.U.
9 The facts are that it was the Range Manager who brought
10 to our attention a number of years ago their concern
11 about possible conflicts with polar bears in this
12 area based on the research of Dr. Lentfer, L.E.N.T.F.E.R.,
13 and because of that we in fact initiated a research
14 program on the possible impacts with caribou -- I am
15 sorry, with polar bears.

16 The point I want to make,
17 is, sir, at that regulatory hearing two months ago,
18 Mr. Roseneau reported that this year, for instance
19 there was a co-operative research program with the
20 State of Alaska authorities, with Dr. Lentfer, and
21 Mr. Roseneau reported the evidence found and it
22 in no way substantiated the conclusions drawn here
23 in several areas by Dr. Weedon. Polar bears normally
24 den offshore on ice. They den on the snow banks-
25 that accumulate near pressure ridges. They occasionally
26 come ashore. From earlier evidence Dr. Lentfer
27 believed that the whole area from the Colville River
28 which is considerably west of Prudhoe Bay right
29 through to the U.S. international boundary was perhaps
30 an important area for denning ashore and it was
several years ago that he expressed this opinion

1 about 25 miles inland and considerable populations
2 being met in that area.

3 The research over the
4 last two years which is part of the biological
5 series published in connection with this hearing,
6 have indicated that the population is much less.
7 In particular this year there were two den sites
8 found on the coast a number of miles north of the
9 proposed pipeline route. There was one expected
10 den site found in the Carter Creek drainage near
11 the proposed right-of-way. This sort of factual
12 information does not support the rather exaggerated
13 claims of possible interaction.

14 So that when you see
15 such expressions as the polar bears may be driven
16 to the sea to find denning area, sir, that is the
17 normal place where they den.

18 There is considerable
19 concern expressed about the calving grounds of
20 the caribou and one reads rather exaggerated statements
21 about driving, harassment will drive the caribou
22 away, harassment or the development may in fact make
23 impossible the area north of the pipeline for calving.
24 If you consult the distribution maps, particularly
25 in the Pipeline Assessment Group's report on
26 caribou, you'll note that the proposed pipeline
27 alignment lies generally north of the area of
28 concentration, the fawning areas.

29 Also, there is several
30 times a statement that --

1 THE COMMISSIONER: The pro-
2 posed pipeline route you say lies north of the fawning
3 areas?

4 A North of the areas
5 of concentration.

6 THE COMMISSIONER: Well, I
7 know that they are distributed widely, no doubt,
8 but you say they 're concentrated south of the
9 pipeline?

10 A Yes, sir.

11 THE COMMISSIONER: Just so
12 I don't misunderstand you. You're principally concerned
13 now about rebutting some of the things that Dr.
14 Weedon said.

15 A I am about to terminate
16 that because it leads into a more general line that
17 I would like to pursue. I think that I have perhaps
18 demonstrated that these are very general. Dr. Weedon
19 has in fact given us very general concerns based on --
20 really, not on the scientific information which he has
21 at his disposal. I think I would prefer not to go
22 into the caribou range because I think perhaps at another
23 time there will be lots of time to discuss this in
24 much greater detail.

25 THE COMMISSIONER: He was
26 dealing with polar bear dens in the Alaskan side,
27 was he?

28 A Yes, sir.

29 Another example, just
30 another example drawn from many of this sort of
treatment. "Under worst case conditions, " I am now

1 reading page 13, sir, "Under worst case conditions
2 it would be possible to harm up to 60,000 oldsquaws
3 and eider ducks." He gives no data, but I could
4 believe his figures are in fact accurate, but no
5 mention, for instance is made that the Fairbanks
6 Corridor route would in fact cross
7 flats where 85,000 waterfowl breed or cross the
8 Koyukuk River where 500 of the rare trumpeter
9 swans breed and its in , with my overall background
10 information , I don't know what's the word to say, whether
11 "frustrating" or "annoying" to see a scientist to
12 draw such generalizations, quite often prejudiced
13 treatment. I might mention that the description
14 of the critical environmental considerations which
15 you feel apply to the Fairbanks route covers one
16 quarter page. Whereas the response to the same
17 question regarding the prime route covered seven.

18 THE COMMISSIONER: Yes,
19 I noticed that.

20 A At one point here,
21 I think that I will go very quickly to page
22 31, and I've underlined there only cumulative
23 effects. He appears at this point, according to my
24 recollection to have departed from the prepared
25 testimony to challenge synergistic effect, as a
26 matter of fact I am not too happy to have ever
27 used the word after what happened, but he challenged
28 this and he mentioned that it was related to the
29 use of tolerance levels and threshold in resource
30 management and he didn't feel that that had
ever been demonstrated, so in order, sir, to let you

see how good your documentation is, I can point out that in fact this is demonstrated and is applied in the fisheries management and this information is available in one of the E.P.B. reports.

THE COMMISSIONER: Well, whether from the point of view of international relations this rebuttal should have been given before Dr. Weedon left, but he is gone --

A Mr. Commissioner, I thought of that, but he had the additional advantage of several months to examine my --

THE COMMISSIONER: No, no, I am not commenting at all on what you said, I am just reflecting --

A Well, in the E.P.B. Environmental Impact Assessment, 1974, volume IV, the research reports, chapter 8, "Fishes", there is in fact mention that the guidelines for water quality objectives and standards which were set by an interdepartmental committee on water by the Department of the Environment, Inland Waters Branch, 1972, provides four levels of protection for aquatic resources based on threshold of harmful effects on resources and I just want to mention this very briefly because the documentation is available to you. But they mentioned the natural background level as Protection Level I, the best protection level; Level II is high protection; Level III, moderate; and these are related to the tolerance to fish of the introduction of contaminant pollutants in

water, and finally Level IV, the threshold level. This is at which the animals would die, that is related to the least lethal level and the lowest level of environmental protection.

To go on, the European Inland Fisheries Advisory Committee of 1965 establishes criteria for environmental protection of fish and stream habitat based on known tolerance levels to contaminants. So, I didn't introduce this thought without some background, and in fact as for research on the synergistic effect, I actually have a reference and it too, is available to everyone, it's Mr. Charle's paper on the effects of pipelines on caribou migrations which were conducted at Prudhoe Bay and published by the University Co-operative Research Unit of the Univeristy of Alaska, 1973. In one of his studies he made a barrier, studied a barrier composed of a haul road and four lines of parallel feeder lines, ground level, as well as expansion routes, and he found that the success of caribou in crossing that barrier was greater than the success they had in crossing a single oil pipeline by means of berms or passing under bridges.

I don't want to continue further, but this leads me to make some general observations particularly in this panel. I have noticed a tremendous ^{difference} in the types of evidence that have been presented. Two main types. First of all scholarly treatments of scientific data in which conclusions are reached by personal evaluation, and the two

presentations that we heard this morning are very much in that group.

However, there is another type of evidence produced before you, sir, and this is evidence of a completely different nature where you have statements of a more political nature, policy statements based on wide ranging generalizations without scientific evidence. I might say that the references to Dr. Weedon's reports --

THE COMMISSIONER: Excuse me, Dr. Banfield, we have had statements that are statements of policy throughout these hearings and we specifically -- well, let me put it this way, we are anxious to hear statements such as we heard this week from the Council of the Yukon Indians and the Indian Brotherhood of the Northwest Territories. Those have a legitimate place in this Inquiry as far as I am concerned. If you are saying that some persons have come forward and have on the footing that they are giving us scientific data and drawing conclusions from that data, and yet making policy statements that are disguised flimsily, you would say, as scientific statements that is another matter.

A Sir, that is the point that I am addressing my remarks to. I have absolutely no comment other than full support to such statements that you have described by the Dene Nation, for instance. That is different and a pure political matter. I am really concerned about the environmental

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field, sir, in which often these statements are presented in a disguise of being competent environmental appraisals and in fact they are policy statements. I think Dr. Weedon was quite clearly -- fell in that area, and I am really beginning to doubt if the legal process of this hearing can truly illuminate the real environmental issues at stake unless some efforts are made to present a more balanced treatment of controversial subjects.

I might, before I go on, sir, I might say, that Mr. Marshall is not aware of what I am about to say.

THE COMMISSIONER: Well, neither am I. Go ahead.

A Sir, I have been impressed by the fairness and the extreme interest you have shown in the many representations, particularly the ones that you have described from the community hearings, and I have also been impressed by the respect that you have shown and the facility and the arrangement for many of the witnesses that have been well qualified witnesses that have come on behalf of intervenors to give their opinions.

I, sir, have been most embarrassed in the restrictions on my role as a panelist on behalf of one of the applicants. The problem as I see it is twofold, sir. The first, you have heard about "canned" evidence and sir, home canning has certain disadvantages. One being that it somehow loses the fresh appeal of the

1 fresh fruit and evidence canned eight months ago
2 now seems to me rather stale or less attractive.
3 In particular, I was invited to appear on this
4 panel to, I thought, discuss and take part in a
5 discussion of alternative corridors, but as a
6 panelist for this client, my role is extremely
7 restricted by the legal procedure, sir.

8 I did not prepare
9 the "canned" testimony. I therefore was unable
10 to express my own feelings which may have been
11 very close to many of the other feelings felt.
12 Instead my only way of giving any evidence
13 is through cross-examination, and this, as you
14 may be aware, sir, is a completely frustrating
15 experience, because one is not able to give a
16 coherent statement. In fact, the only attempt
17 I made was to discuss cumulative or synergistic
18 effects and the horror I saw in all counsel and
19 the reaction has discouraged me from presenting
20 any more evidence until I managed to get to this
21 microphone this morning.

22 If I may humbly make two
23 suggestions, sir. One is that I think that the
24 environmental matters that are controversial
25 environmental matters might well be treated in some
26 sort of debate form. It will come to no surprise
27 to you, sir, to find that there are environmentalists
28 who hold different views and may or may not be
29 able to substantiate them, but in the cross-examination
30 format there doesn't seem to be any way in which the

1 witnesses experience is really adequately explored.
2 I am only encouraged to speak up, sir, because I was
3 at one time encouraged to have confidence in what
4 I was speaking about because I was informed that
5 afterall, keep in mind that the lawyer knows nothing
6 about what you're speaking and it is sort of
7 the emperor's clothing effect.

8 So those are the areas
9 that I would think are worthy of exploration and
10 that really closes the comments I have to make.

11 THE COMMISSIONER: You
12 said that you had two suggestions. Did I overlook
13 one? You said that considering the environmental
14 level --

15 A Yes, --

16 MR. MARSHALL: I think
17 the other one was something to do with shooting
18 the lawyers, sir.

19 A Well, no, sir, that's
20 not quite -- but I do --yes, it is the worst case
21 phenomena. No, but, sir, really one, in this particular
22 role, one does feel like a duck in a shooting gallery,
23 and as you've noticed, I have become increasingly
24 gunshy, because of this inability to express oneself
25 in a whole argument, and you know, simply answer
26 yes or no. Now, actually counsel have not been like
27 that all -- I retreat from that, that is an exaggeration
28 without substantiating evidence, but that sort of
29 constraint is on one.

30 No, the other recommendation
is for counsel of CAGSL and that is to permit the

1 environmentalist witnesses to present their
2 own evidence live. I have noticed this, that
3 my own feeling is that those witnesses brought
4 by CARC appeared very live, but --

5 MR. COMMISSIONER: Dr.
6 Geist --

7 A Particularly,
8 particularly, sir.

9 At one point I was going
10 to tell you that I really learned nothing new at
11 this Inquiry that I didn't really know and what
12 isn't available to everybody from an environmental
13 point of view but I would have to add that every
14 time I listen to my colleague, Dr. Geist, I always
15 learned something and I noticed that you had trouble
16 assimilating the same factor I did, and that was
17 a biochemical formula that had some sort of an
18 energy equivalent exchange which he threw in very
19 quickly and you struggled, and I struggled and
20 decided to just reject the whole problem of
21 trying to assimilate so much new information.

22 But in contrast, I
23 found that I was very much restricted and undoubtedly
24 in my appearance I appear as a ghost or a very pale
25 person --I'll say it, a zombie, in comparison with the
26 witnesses called by CARC because of the entirely
27 different structure in the constraints on my
28 activity and I noticed this the first day and
29 it undoubtedly is an explanation for the rather
30 jaded replies of some of the fellow panelists

1 and since this predates panel number 3, I hope
2 that in some way the environmentalists associated
3 with this project, can be permitted to appear more
4 alive and interested and involved and not supporting --
5 oh, one more comment about canning. As you know
6 when you can fruit you blanch them and I thought
7 that this was a very effective comparison because
8 our environmental data was blanched with the
9 extreme hot air -- steam, sir, steam of lawyers
10 some time ago and legal jargon, sir, and so with
11 the legal jargon it doesn't seem to come alive
12 as direct evidence.

13 Thank you.

14 THE COMMISSIONER: Well --

15 A I may not be at
16 Panel IV, sir.

17 THE COMMISSIONER: Well,
18 Dr. Banfield I sincerely hope that you are on the
19 environmental panel that Arctic Gas presents when
20 we reach the environmental phase in a formal
21 sense. The points you made I think are well worth
22 the consideration of counsel and you said that
23 counsel for Arctic Gas should give particular
24 consideration to them and I second the motion.
25 Let me say that it is not for me to tell Arctic Gas,
26 Foothills,^{the}/environmentalists, the native organizations
27 how to go about presenting their case. I can say
28 something to my own Commission Counsel, but essentially
29 that is a matter that I leave to Arctic Gas, Foothills,
30 the environmentalists, the native organizations.

1 They decide how to bring it forward. I think your
2 suggestion that -- let me put it this way, I think
3 the concern you've raised, that you felt inhibited
4 in that panel setting because someone was reading
5 this 25 page summary of the views of eight people,
6 that concern seems to me to be one that is altogether
7 --it's altogether right that you should have brought
8 it forward and I urge all counsel to bear in mind
9 the things that Dr. Banfield has said. I don't
10 -- I won't join this general denunciation of the
11 legal profession because I have certain antecedents
12 in that profession.

13 I think though, Dr.
14 Banfield that it is important to remember, you
15 disagree in the way in which Dr. Weedon approached
16 this problem and just as I was listening to you
17 I was thinking about the usefulness of a public
18 Inquiry in this kind of decision making process,
19 because I know you would agree that it would be al-
20 together wrong if governments and departments of
21 government were to decide these very important
22 questions on the strength of reports such as Dr.
23 Weedon's or a report from you without letting those
24 who disagree come forward and challenge it openly,
25 and making those who have made assertions that
26 others disagree with, defend them in the open.

27 Now, it seems to me that
28 the experience we have had here this morning illustrates
29 better than a lot of political science papers ever
30 could the usefulness of that process. I am intrigued

1 by your idea that the environmentalists should
2 have a kind of open debate when we reach the environ-
3 mental phase as opposed to this week we have had
4 on alternate corridors which we decided to do here
5 in Whitehorse because it was of concern to the
6 people of the Yukon and we have acknowledged through-
7 out the week that it was not possible to hear all
8 **sides of every** question and we had agreed to go back
9 to Yellowknife and complete some of those -- the
10 examination of some of the issues that couldn't
11 be fully developed here.

12 But the only other thing
13 I think I should say is that we are doing this in
14 Canada for the first time, seeking to examine the
15 social, environmental and economic questions, and
16 I hope that other witnesses, whether they are
17 witnesses for the pipeline companies, the environment-
18 alists, the native organizations or witnesses brought
19 forward by Commission counsel, will feel free as
20 you have to comment on the procedure that your own
21 -- that the participant who brought you forward has
22 thrust upon you, or that I have thrust upon --

23 I hope that all the
24 witnesses will feel free to make constructive
25 comment as Dr. Banfield has done on the procedures
26 we are following because we are doing this for
27 the first time in Canada and we want to do it right
28 and if the legal procedures that invariably find
29 their way into such an inquiry are restricted, the
30 freedom that witnesses feel they ought to have to

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1 speak out on vital issues, then I want to know
2 about that, but notwithstanding all of that I think
3 lawyers have an important function in the universe
4 and so. I think that it is time to adjourn.

5 MR. GOUDGE: Yes, sir,
6 it is one o'clock and I may say that I look forward
7 with great eagerness to Phase III. I take it
8 sir the formal hearings will adjourn now until
9 Monday next at one p.m. in Yellowknife?

10 THE COMMISSIONER: Yes.
11 They are adjourned.
12 (PROCEEDINGS ADJOURNED)

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